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A
TREATISE
ON THE THREE DIFFERENT
DIGESTIONS,
AND
DISCHARGES
OF THE
HUMAN BODY.
AND THE
Diſeaſes of their Principal Organs.

By EDWARD BARRY, M.D. F.R.S.
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> *Subjectum iſtud Medicinæ, (corpus nimirum humanum) ex omnibus, quæ Natura procreavit, maxime eſt capax Remedii; ſed Viciſſim, illud Remedium maximè eſt obnoxium Errori.*
> Bacon *de Augment. Scient. Lib.* IV. *Cap.* 2.

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TO HIS

ROYAL HIGHNESS

GEORGE

Prince of Wales.

May it pleaſe your Royal Highneſs,

THE following Sheets, were compoſed with a View of adding ſome Improvements to the *Art* of *Healing*; and as your Royal Highneſs is eminently diſtinguiſhed for a humane, and benevolent Diſpoſition of Mind; I preſumed that whatever contributed to promote the Welfare, and Happineſs of Mankind, could not fail of meeting with your gracious Acceptance.

THE Arts, and Sciences, naturally ſeek the Protection of great Princes, they languiſh without it; but have always received a particular Luſtre

DEDICATION.

Luſtre from the Influence of thoſe, who, like your Royal Highneſs, have in themſelves early cultivated, and adorned them.

I am, with the greateſt Reſpect,

your Royal Highneſs's

moſt obedient

humble Servant,

EDWARD BARRY.

THE PREFACE.

IT is now more than thirty Years, ſince I publiſhed a Treatiſe on a Conſumption of the Lungs; in which I attempted to explain their Structure, and the Nature of Nutrition: The Principles, from whence I chiefly deduced my Obſervations, were ſuch as the learned Dr. *Boerhaave* had laid down: I regarded him then with all the favourable Prejudice, and warm Gratitude of a Pupil; nor has the Experience of many Years altered my Opinion: His Reaſoning on the animal Oeconomy, and his general Rules of Practice, will be eſteemed, while true Philoſophy prevails, and Nature is the Guide, which directs the Phyſician's Conduct.

I HAVE ſince at my leiſure Hours, endeavoured to correct, and give more Strength, to that imperfect, and too early Performance, and to enlarge it with practical Obſervations: But by often reflecting on this Subject, a more extenſive Plan opened to my View, which was to explain the *Procedure*, and to *aſcertain* the *Extent*, and *Limits*, of the *three* different *Digeſtions*, and *Diſcharges* of the human Body; to ſhew their *Analogy*, and in what Manner they are incident to *Diſeaſes peculiar* to their *principal Organs*, or to ſuch as are *derived* on them, from *Defects* in the *former* Digeſtions, and Diſcharges.

There is ſuch a mutual Connection between them, that a Defect, or Error in either, ſeldom ſingly exiſts, without extending its Influence to the others: Sometimes the Cauſe is more evident, and the Effects more immediately prevailing in that Digeſtion, and Diſcharge, whoſe principal Organs are affected: Sometimes they chiefly appear in the ſucceeding Digeſtion, and Diſcharge, while the original Cauſe is more diſtant, and latent.

The Rules for preſerving Health, chiefly depend on maintaining ſuch an uniform Strength in the different Digeſtions, that the Aliment ſhould be aſſimilated to animal Fluids, and the Diſcharges be equal to the Supplies, and in a juſt Proportion to each other: Diſeaſes will ariſe, when they deviate from this healthy Standard; and their Difference will depend on the Importance of the Digeſtion, or Diſcharge, and the Degree, in which their principal Organs are affected.

To mark, and point out the Sources, from whence theſe various *Defects*, and *Irregularities* proceed, will lay the beſt Foundation of explaining the Nature, and Progreſs of chronic Diſeaſes, and of eſtabliſhing a rational Method of Cure; which can never be effectual, until they are *corrected*, and *regulated.*

I HAVE ſketched out the Diſeaſes to which the principal Organs of the different Digeſtions, and Diſcharges are chiefly liable; and have more particularly deſcribed the Origin, and Progreſs of the Diſeaſes of the Lungs, which are the *principal Organ* of the *ſecond* Digeſtion. I have not advanced any *Hypotheſis*, or given any Rules of Practice, but what are deduced from the Structure of the Parts, and confirmed by Obſervation, and Experience. It was more difficult to contract this

Work within the Limits I preſcribed to it, than to enlarge it, where ſuch an ample Field was opened: If it contributes to promote the *Art* of *Healing*, or can furniſh any Hints to others, to improve it more effectually, it will anſwer the chief End I propoſe in offering it to the Public.

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CHAP. I.

Of the Firſt Digeſtion.

A Human Body, being compoſed of an almoſt infinite Number of *Veſſels*, and *Fluids* circulating through them, is from the very Nature of its Frame, ſubject to a conſtant Decay; for ſince *Attrition*, is the unavoidable Effect of *Motion*, by which the ſtrongeſt Bodies are at length deſtroyed, it is impoſſible but that Veſſels of ſuch a tender Fabric, if not frequently repaired, muſt be ſoon abraded by a continued Circulation.

No ſingle Part, has a conſtant Duration, even the moſt ſolid is not free from this common Fate, but, like the reſt, ſucceſſively periſhes, and is reſtored: It has been found by repeated Obſervations, that all the Hair in the Body is renewed twice in a Year, the Nails every two Months, and even the Thigh-Bone, if broken, will unite, by emitting Fibres, which acquire an equal Solidity with the reſt, in the Space of ſixty Days. The Surface of the Body, though ever ſo cautiouſly preſerved, gives quickly a Tincture to whatever is applied to it, which when examined with the beſt Microſcopes * appears to be compoſed of the ſeveral conſtituent Parts of the Solids, and Fluids, which conſtantly exhale, and periſh.

These continual Abraſions of the ſolid Parts, and the Loſſes which the Fluids ſuſtain in Reſpect to their *Quantity*, require a conſtant Repair; which is likewiſe made more neceſſary by the *Quality* of the Fluids being ſo altered by repeated Circulations, and by being deprived of their fineſt, and moſt diluting Parts, that inſtead of continuing fit for Nouriſhment, they at length become deſtructive, and acquire in ſome Degree the Nature of a mineral Poiſon, whoſe Malignity conſiſts in the *Gravity* and *Acrimony* of its Particles; for the Materials of Nouriſhment muſt be always ſpecifically lighter than the Blood; and the *Chyle*, and Milk, as *Lower* * has obſerved, float on the Surface of the Blood; therefore the *Denſity* of the Fluids, being perpetually increaſed by the compreſſing Force of the Veſſels, the longer they receive their Action, without the Addition of new diluting light Particles, the more compact, and heavy they become, and as the *Attrition* and *Heat* of the Fluids increaſe in Proportion to their *Denſity*, and *Velocity*, the *ſaline*, and *oily* Particles, become thereby more *exalted*, and acquire ſuch a Degree of *Acrimony*, as muſt unavoidably in a ſhort Time deſtroy the Body.

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* Leuwenhoeck, Tom. IV. Epiſt. 43.

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* *De Chylo, ejuſque in Sanguinem Tranſitu, et Tranſmutatione.*

THE Truth of theſe Poſitions, is confirmed by the following Experiment: If the Humours of a healthy Man, are received into a Veſſel, and agitated with a Degree of Heat equal to that which is natural to a human Body, they in three Days acquire a very pungent *Acrimony*; and in ſix Days become putrid. From whence it is very evident, that the circulating Fluids, gradually receiving ſuch a Diſpoſition, (though a longer Space of Time is in this Caſe required) muſt ſoon deſtroy the tender Veſſels of the Brain; and from this Cauſe, ſuch as periſh by

Hunger, are generally ſeized with a raving Madneſs before they die.

THE Neceſſity of a conſtant Repair of the Solids, and Fluids, being thus evident, I ſhall endeavour to explain the *different Digeſtions* which the Aliments ſuffer, and the neceſſary *Excretions,* or Diſcharges which are made from thence, until they are converted into an *Animal Fluid,* fit for Nouriſhment. I ſhall avoid entering into the Anatomical Structure of the Parts, which are already ſo well known, and deſcribed, any farther than may be neceſſary to explain ſome of the material Changes which the Aliment undergoes, or to deduce from thence ſome uſeful, or practical Obſervations.

ALL the *Fluids* are produced from what we eat, and drink, and all the *Solids* are compoſed of the Materials which theſe Fluids contain. There are no Vegetables whatever, (except they be in ſome Degree of a poiſonous Nature) but what, with plain Water, will afford Nouriſhment to a healthy Perſon, accuſtomed to them; neither will the Reverſe of ſuch a Diet, the greateſt Luxury of Food, prevent others from being ſufficiently nouriſhed: A human Body, being a Machine ſo admirably formed, that it can aſſimilate the greateſt Variety of Humours, and reduce them to a Temper like its own.

The Food taken for Nouriſhment, is greatly prepared by *Maſtication*, which breaks, and reduces it into ſmaller Parts, and mixes it with the *Mucus* of the Mouth, and the *ſalival* Juice, whoſe great Uſefulneſs may be known from its Origin (being ſeparated from the pureſt arterial Blood), and the good Effects it produces by being ſwallowed: Whereas ſuch, who imprudently diſcharge this uſeful Humour, become more liable to *Indigeſtion,* and a bad Habit of Body.

The Aliment likewiſe receives a very conſiderable Change in *Maſtication,* from the ſtrong Action of the Muſcles, and the Form of the Teeth, variouſly adapted to theſe Uſes.

From hence may be explained the Obſervation of *Hippocrates* *, That *ſuch as live to a great Age have many Teeth;* as their Preſervation not only denotes a healthy State of the Fluids, and a Freedom from Acrimony, but that the Food is generally well prepared; whereas ſuch who have bad, or few Teeth, are from an imperfect *Maſtication,* more ſubject to ſuch Diſorders as ariſe from Indigeſtion.

The Aliment thus prepared, and received into the *Stomach,* is there farther altered, and digeſted by its *Heat*, the Mixture of the Juices *ſeparated*, or *contained* in it, the *mechanic Action* of its Fibres, and the *compreſſive Force* of the contiguous Parts.

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* Lib. 2. Sect. VI. Eped.

THE *Heat* of the Stomach in a healthy Man, is greater than the common Heat of the *Sun* in a Summer's Day; and ſuch appears from many *Experiments*, to be more proper for the *Digeſtion*, and *Diſſolution* of *Bodies*, than a much greater Heat, which, by carrying off the finer Particles, frequently *fixes*, and *coagulates*, what by a milder Heat would be *attenuated*, and *reſolved*: Whence it is evident, that if the *Stomach* be conſidered only as an inactive *chymical Veſſel*, agitated with ſuch a Degree of *Heat*, the Aliment received into it, diluted, and mixed with the Humours ſeparated, or contained there, will be from thence greatly *attenuated*, and reduced into a more *ſoft* and *fluid* Subſtance.

THE Comminution of the Food, is likewiſe greatly aſſiſted by the intimate Admiſſion of the Air, whoſe *expanſive Force*, when retained in a cloſe, warm Place, increaſes in Proportion to its *Heat*, and the *Preſſure* on it; which in the Stomach are very conſiderable, and by the reciprocal Motion of the Diaphragm, and Muſcles of the Abdomen, perpetually varied; by which means, the inteſtine Force of the Air, mixed with the Food, being thence ſucceſſively expanded, and contracted, more powerfully contributes to a greater Comminution of it, than one continued Preſſure, though of greater Force.

THE *internal* Coat of the Stomach, by being much larger than the others, but contained within the ſame Space, muſt unavoidably riſe into *Ridges*. The Surface of it, is likewiſe made more unequal by ſeveral Glands, which terminate in its Cavity, and which ſupply a mucilaginous Humour, neceſſary to defend it from the Acrimony of the Food: Several arterial Branches likewiſe terminate there, which perpetually exhale a thin, diluting Fluid, not unlike the *ſalival* Juice.

THESE natural Humours, with ſome Remains of the former Meal, which from this Structure muſt be retained there, will moſt commonly promote a *Fermentation* of the next Food, which will, in ſome Meaſure, contribute to Digeſtion, by giving a greater Attenuation to the Aliment thus agitated; but this is not to be conſidered (as it has been by many Writers on this Subject) as a principal Agent in *Digeſtion*, or as always neceſſary when a ſimple Aliment is uſed: Neither is ſuch a *Fermentation*, tho' often begun, ever perfected there; for that

Operation can never be completely finiſhed, unleſs the fermenting Bodies remain undiſturbed in the ſame Veſſel, until their inteſtine Motion gradually ceaſes; which is prevented by the muſcular Fabric of the Stomach, and the compreſſive Force of the contiguous Parts.

THE Force of this muſcular Action, increaſes in Proportion to the *Quantity*, and *Acrimony* of what is received into the Stomach: On this Account, when it is too much diſtended by Debauches, it becomes moſt incapable of diſcharging its Contents, the Fibres being thereby irritated to a greater Contraction, which is always ſtronger at the Orifices, than in any other Parts, as the Fibres are there more cloſely collected and united. Hence the greateſt Anxiety, ſucceeds ſuch a Fulneſs, and continues till the diſtending Preſſure is ſo great, as to overcome the Reſiſtance of either Orifice; by which Means it terminates generally in Vomitting, or Purging; but moſt commonly in the latter, the Fibres in the ſuperior Orifice being more compact, and leſs yielding, than in the *Pylorus.*

It is evident, from well-known Experiments, that the Stomach, when moſt contracted, either by the natural Force of its Fibres, or by being irritated by the ſtrongeſt Emetics, is never ſo far diminiſhed in its Capacity, as to bring its oppoſite Sides to a mutual Contact; which was a favourite Opinion of ſome eminent Authors, and particularly of *Pitcairn* *, who from mechanic Principles aſſigned ſuch an immenſe grinding Force to it, as may be alone ſufficient to produce, and explain all the Changes, which the Aliment receives from it.

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* Diſſertatio de Motu quo Cibi in Ventriculo rediguntur ad Formam Sanguini reficiendo idoneam.

* BORELLUS endeavoured to demonſtrate, that the muſcular Force of the *Flexor Policis,* which weighs 122 Grains, is equal to 3720 Pounds: And *Pitcairn* from this Propoſition concludes, that the muſcular Force of the Stomach, which at a Medium weighs eight Ounces, or 15126 Grains, muſt be equal to 117088, as the Force of different Muſcles will be always in Proportion to their reſpective Weights. But not ſatisfied with this very great Power, he inveſtigates in the ſame Manner, the Force of the Abdominal Muſcles compreſſing the Stomach, and increaſing its Action. But though this Propoſition of *Borellus* was allowed to be true; yet it by no Means follows, that the muſcular Fibres of the Stomach, whoſe Directions are very different from thoſe in that *penniform* Muſcle, can exert the ſame Force.

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* De Motu Animal. Propoſ. 126.

Tho' many juſt Objections may be made to theſe wild Computations, it will be ſufficient to point out one general Error which runs through the whole, in not making any Diſtinction between the *abſolute Force*, which a Muſcle can exert, and that *real Force*, which it uſually does exert; and likewiſe between that muſcular Action, which is exerted by the ſtrong Power of *the Will*, and only for a ſhort Time, and that which is *involuntary* or *ſpontaneous*, and continued for a long Time. Thus *Borellus* *, from the Structure of the Heart, eſtimates its Force to be equal to 3000lb. And *Keil* †, from ſeveral Experiments, computing the Force with which the Heart expelled the Blood, as erroneouſly concludes it to be equal only to ſixteen Ounces. The former aſſigning that *abſolute Force* to it, which he had deduced from mechanic Principles; and the other that *Degree* of it, which was exerted in the *Experiments* he had made: So widely theſe ingenious Gentlemen differ from each other. But whatever the abſolute Force of the Heart may be, it is probably never exerted; and in healthy Bodies muſt be always greatly ſuperior to the Reſiſtance which it overcomes; otherwiſe it would not be capable of preſerving, and continuing its Motion ſo many Years: A very ſmall Degree of it, is only impended on yielding Fluids, and will, *cæteris paribus*, always increaſe in Proportion to the Reſiſtance it meets with, and be moſt exerted when its *abſolute Force*, and the *Reſiſtance*, are *equal*; at which Inſtant, it will be no longer able to contract, and expel the Blood from its Ventricles.

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* De Motu Animal. Propoſ. 67.

† Tentam Med. Phyſica.

THE *Orbicular Fibres* chiefly contribute to give to the Stomach its moſt material, *Periſtaltic Motion*, which is a ſucceſſive, alternate Contraction of theſe Fibres, beginning at the upper Orifice, and continued to the *Pylorus*. From this varied Contraction, and Relaxation, the Food receives a more exquiſite Comminution, than from an equal, continued Action, and is thence particularly determined to the *Pylorus*, through whoſe contracted Orifice, the finer Parts ouze out into the Duodenum; and the more groſs remain in the Stomach, until they are gradually ſo far attenuated, as to be capable of paſſing off in the ſame Manner. When the Stomach is ſo far emptied, as not to be diſtended beyond its natural Tone, the *Pylorus* becomes ſo open and flaccid, as to give a more eaſy Paſſage to the Contents of the Stomach, which are thence expelled from the ſame Cauſes acting on it.

THE Alteration which the Food receives in the Stomach, from its own im-

immediate Heat, and the mechanic Action of its Fibres, are greatly promoted by its Situation, between the largeſt and moſt warm Bowels in the Body. On its right Side the Liver is *placed*, whoſe Heat, from the great Quantity of Blood circulating through its Veſſels, is very conſiderable. On its left Side, lies the *Spleen*, the *Pancreas* under it, the *Diaphragm* above it, by whoſe Heat, and Motion, it is warmed, and agitated: Before it is placed the *Peritoneum*, which by the ſucceſſive Action of the Muſcles of the *Abdomen*, gives a Motion to the Stomach, oppoſite to that which it receives from the *Diaphragm*; ſo that it lies as in a Preſs between them: Behind it is placed the *Aorta*, the largeſt Veſſel in the Body, whoſe Heat, and conſtant Vibrations, are very conſiderable.

Whoever juſtly eſtimates theſe powerful concurring Cauſes, will find them ſufficient to account for all the Changes which the Food ſuffers in the Stomach: For its Powers are much weaker, than they are generally ſuppoſed to be, and not capable of diſſolving the *ſolid* Parts of Animal or Vegetable Bodies; but only of attenuating, and expreſſing their *fluid* Parts. This is confirmed by repeated, and obvious Experiments; for *Currants*, *Grapes*, or any other *Fruit*, or *Seed* ſwallowed whole, and entire, remain ſo in the Excrement.

Hence the Reaſon plainly appears, why the Stomach is not *diſſolved* by its own Action? of which it muſt certainly have been in great Danger, if it contained an *active Ferment*, or could excite ſuch a powerful *Attrition*, as might be capable of diſſolving, or grinding the ſolid Parts of ſuch Food, as are often received into it, and which have as ſtrong a Coheſion as the Stomach itſelf.

THERE are ſome Animals, whoſe Stomachs are formed of ſuch rigid, thick Muſcles, and in which the mutual Attrition of their Sides is ſo ſtrong, as to be alone capable of reducing, and grinding ſolid Food, and ſupplying the Place of the Teeth; and particularly of the *Molares*, whoſe Surface is large, and rough, and which are generally deficient in ſuch Animals: But the Structure of the Stomach, in the human Body, is much more ſlight, and tender, and only Membrano-muſcular, and its Action much weaker. Neither are Dogs capable of diſſolving any ſolid Food, or reducing Bones (as the common Notion prevails) into a white Powder, by the Attrition of their Stomach; for if they are given to them in any Morſel, and ſwallowed whole, they will be diſcharged unaltered, and only aſſume that Texture, and Form, when they have firſt gnawed the Bones, and reduced them into a Powder.

MOST Authors, who have endeavoured to explain the Digeſtion of the Food in the Stomach, have been ſo fond of a particular *Hypotheſis*, as to reject entirely that of ſome others, which, though not entirely, has been perhaps partly true. Thus the *Galeniſts*, have aſcribed the Cauſe of Digeſtion to the *Heat* of the Stomach, the *Chymiſts*, to a *diſſolving Ferment*, and the *Mathematicians*, to the *mechanic Action* of its Fibres, and of the contiguous Parts: Whereas no ſingle Cauſe is ſufficient; but all in different Degrees, contribute to produce that Alteration, which the Aliment undergoes.

BASIL VALENTINE was the firſt among the Chymiſts who ſuppoſed that Animal Digeſtion was owing to an acid diſſolving Menſtruum. *Paracelſus* received this Opinion from him. *Van Helmont* carried it farther; and aſſerted, that the

Spleen prepared this *Menſtruum*, which was from thence conveyed into the Stomach, by the *Vaſa brevia*. *Sylvius* raved of his *Duumvirate*, and carried the Efferveſcencies, excited in the *Duodenum*, from a Mixture of an *acid*, *pancreatic* Juice, and an *alkaline* Bile into the Blood, and endeavoured to account not only for the Digeſtion, but for moſt Diſeaſes, and their Method of Cure, either from ſuch Efferveſcencies, being too *intenſe*, or too *languid*. Theſe Notions long prevailed, and introduced many Errors in Practice, until they were at length exploded by later Diſcoveries, made in Anatomy, and in Chymiſtry. *Lower* has moſt accurately deſcribed the Courſe of the Veſſels, diſtributed through the chylopoietic Bowels; and has ſhewn that the *Vaſa brevia* receive Humours from the Stomach, but convey none to it; and from repeated, and exact Experiments, it appears, that no *acid*, or *alkaline* Humour, is either ſeparated in the Stomach, or in any other Part of the Body; neither are ſuch Effervescencies thence excited, either in the firſt Paſſages, or in the Blood. Whatever Acid is contained in the Stomach, proceeds from the Remains of the former Food; and though it frequently contributes to promote Digeſtion, yet it is by no means abſolutely neceſſary to it, and may, in ſome Caſes, be injurious, when *Elixir proprietatis Tartarizatus,* and *Vinum Aloeticum Alcalinum,* which are of a Nature oppoſite to that of Acids, may with Succeſs be given, to create an Appetite, and improve the Digeſtion: And it is farther obſervable, that the Humours, which are contained in the Stomachs of the moſt rapacious Birds, Fiſhes, and Beaſts of Prey, have never an *acid*, but a *ſaline* Taſte.

The Aliment, thus far digeſted in the Stomach, and expelled into the Inteſtines,

teſtines, receives greater Changes from their Heat, and Preſſure, the Mixture of the Bile, Pancreatic Juice, and the exhaling, and ſecreted Fluids, from the Veſſels, and Glands: The mechanic, muſcular Action of the Inteſtines, on the Aliment contained in them, is greater than that of the Stomach, as their Diameter is much ſmaller, and their internal Coat, by being more than three Times larger than the reſt, riſes into larger, and more cloſe Ridges, which in their greateſt Contraction, come to a mutual Contact, and therefore muſt produce a ſtronger Attrition, and Comminution, and a more intimate Mixture of the Humours contained in them; by which means, but chiefly by their *periſtaltic* Motion, which is more ſtrong, and permanent, than in the Stomach, the finer Parts of the Chyle are ſucceſſively propelled into the *alternately relaxed*, and then more *opened* Orifices of the lacteal Veſſels.

Is not this muſcular Action, alternately relaxed, and contracted, ſomewhat analogous to that of the Heart? and is not the Power of Abſorption alone, inſufficient to receive, and propel the Chyle through the Lacteals, whoſe Motion acquires no immediate Influence from that of the Heart? On which Account, this Defect is not only ſupplied in their Origin, but through their whole Courſe, by a various, and exquiſite muſcular Motion.

Hence appears the Reaſon, why the Lacteals could never by any Art be injected in dead Bodies? Their *oblique* Situation, and Minuteneſs, requiring this peculiar Motion, to overcome their Reſiſtance; and hence likewiſe 'tis evident, why Humours, which have ſuch a Degree of Acrimony as would be injurious to the Blood, cannot eaſily gain Admittance into them? For by the Irritations which the Fibres excite, they are drawn into *conſtant* Spaſms, which during the Continuance of them, cloſe their Orifices, and deſtroy their *ſucceſſive* periſtaltic Motion, which will not be reſtored, until the Acrimony is expelled, or ſufficiently diluted, by the Humours ſeparated from the Extremities of the Arteries, during the Action of this *Stimulus* on them: And on this Account, ſome Medicines which are of a *poiſonous* Kind, do not act as ſuch, by mixing with the Blood; but by raiſing an Inflammation, and Mortification in the Stomach, and Bowels; and whenever they are ſo far corrected, or diluted, as to be admitted into the *Lacteals*, they may often become moſt uſeful, and *active Alterants*: *Van Helmont*, therefore, might with more Juſtice, have placed his *Archæus* there, than in the Pylorus, which he conſidered as a careful Centinel, that denied a Paſſage to any Thing injurious to Life.

THERE is a remarkable Difference between the ſmall, and great Inteſtines: The former (except the *Duodenum*) have various Circumvolutions; the latter very few, and in a more regular Direction: Theſe have a larger Cavity, and more diſtant, and fewer Valves, and theſe only in the *Colon*, which are formed by the *Shortneſs* of its Ligament; in the other, the Valves are frequent, and cloſe, and formed by the *Length* of its internal Coat. The Propulſion of the Humours in the ſmall Inteſtines, is promoted by their muſcular Action, and periſtaltic Motion; in the other, chiefly by a ſtronger muſcular Motion. The former have the *Lacteals* inſerted in them, which *receive* the prepared Chyle; the others *retain*, and *expel* the Excrements, and are largely furniſhed with Glands *, admirably contrived for theſe Uſes.

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* Vide Peyeri Parerga Anatomic. Ex. I.

THE Bile is the moſt *concocted* Humour in the Body, being ſeparated in the Liver, from Blood, which has twice paſſed through the Extremeties of the Arteries, (for ſuch theſe of the Vena Porta may be conſidered) and has been deprived of its finer Parts, by previous Secretions; and is therefore more capable of giving the moſt material Changes to the *crude* Aliment. This *natural Digeſtive*, which poſſeſſes greater real Virtues, than what the Chymiſts have aſſigned to imaginary Ferments, and Precipitants, chiefly contributes by its ſaponaceous Activity, to attenuate the Viſcidity of the Aliment, and to give to its diſunited, various Parts, the firſt Appearance of *Chyle*, and of an *uniform* Fluid. It is evident, from the great Number of *Meſeraic* Veins, and their Size, (which is much greater in Proportion to that of their Arteries, than in other Veins of the Body,) that the finer Parts of the Aliment are received into the abſorbent Veſſels, which are diſperſed through every Part of the internal Surface of the Inteſtines, and which immediately communicate with the Meſeraic Veins. This Mechaniſm is abſolutely neceſſary to dilute the returning Blood in theſe Veins, which muſt otherwiſe have been very viſcid, having been deprived of its finer Parts by the large Secretions made from the Meſenteric Arteries, through the whole Tract of the Inteſtines; and it is likewiſe more than probable, that the more acrid, and active Parts of the Bile, which remain diſſolved in the Inteſtines, after the Chyle has paſſed the Lacteals, are likewiſe received into the Meſeraic Veins, which gradually uniting, and terminating in the *Vena porta*, ſoon return again, by this ſhort Circulation, to the *Liver*; and by theſe Means ſupply it with active, genuine Materials, fit for the more eaſy Preparation, and Secretion of *new Bile.*

HENCE appears the Reaſon, why, after long Faſting, and Exerciſe, the Skin, and Eyes, are apt to be tinctured with a yellow Colour? The more viſcid, and groſs Remains of the Bile, from the Want of a diluting Vehicle, becoming leſs capable of being abſorbed, and of entering the Meſeraic Veins, are more eaſily received into the *larger* Lacteals, and thence into the Blood; where, in an healthy State, it never ſeems to have Admittance, eſpecially in any large Quantity, or vitiated with any Degree of Acrimony.

HENCE appears likewiſe the Reaſon, why the *German Chalybeat Waters*, the Decoctions of aperient Plants, ſuch as *Endive*, *Succory*, *Turmeric*, and ſuch Medicines as have very fine, and active Parts, are ſo uſeful in removing Obſtructions in the Liver? By being more eaſily received into the Meſeraic Veins, they are more quickly conveyed with their *unaltered Virtues*, to the *Vena porta*: Whereas ſuch which paſs through the Lacteals, can arrive there only in the common, ſlow Courſe of Circulation, where they may act as Alterants, or Diuretics, but cannot deſerve the Name of *Hepatic*, deobſtruent Medicines.

THUS the Aliment receives perpetual Changes from Heat, and Motion, and the Mixture of digeſted, animal Fluids, until it enters the *Lacteals*, in the Form of *Chyle*; and in its Paſſage through them in the Meſentery, and through the Thoracic Duct, is conſtantly more diluted with a great Quantity of fine *lymphatic* Juices; for as the *Vena cava* receives all the returning Blood, ſo the Thoracic Duct receives all the lymphatic Fluids, returning from all the *inferior* Parts of the Body, and from the Chylopoietic Bowels; and as their

Quantity is much greater than that of the Chyle, it may more properly deſerve the Name of *Vena cava Lymphatica*, than that of *Ductus Chyliferus*.

THE Nerves, which are diſtributed to the Stomach, and Inteſtines, are much more numerous, and large, than ſeem to be neceſſary for their muſcular Motion: This uncommon Diſtribution is ſo very remarkable in the Meſentery, that * *Willis* compares the various Ganglions, and Collections of them from whence the reſt are diſperſed, to the *Sun*, and *Planets* ſurrounding it, and dignifies the principl *Plexus* with the Title of *Solaris*. It is therefore more than probable, that the Chyle in its Paſſage through the Meſentery, is impregnated with a great Quantity of *Animal Spirits*; and I ſhall hereafter more paricularly endeavour to ſhew, that the Nerves terminate in ſeveral Parts of the Body, where they perpetually exhale that animating Fluid.

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* Nervorum Deſcriptio Cap. xxvii.

HENCE evidently appears the Reaſon, why ſuch as have a bad Habit of Body, receive but an imperfect Nouriſhment from the beſt prepared Aliment? The Chyle made from thence, being ſoon depraved by the vitiated Juices which are mixed with it. And why they who have faſted for a long Time, or have recovered from acute Diſtempers, if they take ſuddenly too great a Quantity of Nouriſhment, are either immediately injured by it, or are more ſlowly apt to fall into Obſtructions, and particularly of the Meſentery? Their Fluids being waſted to ſuch a Degree, as not to ſupply a ſufficient Quantity to dilute, and prepare the Chyle: On this Account *Hippocrates* * very juſtly obſerves, *that the more unhealthy, or impure Bodies are nouriſhed, the more they are injured by it.*

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* Sect. II. Aph. 10.

What remains of the Aliment, after the Separation of the Chyle from it, acquiring a Degree of Putrefaction, is *collected*, and *retained* in the large Inteſtines, in a certain Proportion to their Strength, and Heat, and to the Quantity, and Nature of the Food, until it is *diſcharged*, as unfit for farther Uſes.

Hence appears the Reaſon, why Perſons of the ſtrongeſt Conſtitution, are moſt apt to be coſtive? As the Chyle is not only more completely preſſed into the Lacteals, but the finer Parts of the collected *Fæces*, are by the Heat, and Strength of the great Inteſtines, received into their *abſorbent Veins*, which, like ſo many *volatile Spirits*, raiſed by Diſtillation from putreſcent, animal Bodies, greatly contribute to animate the whole Machine.

Hence likewiſe appears the Reaſon, why Perſons of a low, *Nervous* Conſtitution, are generally ſo much depreſſed by the lighteſt *Purgatives?* and why that is in a great Meaſure prevented, or removed by the Uſe of *Aſa fœtida*, and *volatile Medicines?* as they ſupply to the Blood, and languid Inteſtines, what is in ſome Degree analogous to that, which is abſorbed from well digeſted Fœces.

SECT.

SECT. I.

Of a depraved Appetite, and Indigeſtion.

FROM this Account of the firſt Digeſtion, the Cauſes may be evidently explained, which naturally *excite*, or *deprave* the Appetite, what *artificial Stomachics* are proper to reſtore it, and their *Manner* of Operation.

HUNGER is produced by a grateful, though uneaſy, Irritation of the Stomach, which if *increaſed*, becomes *painful*; for the Cauſes of all ſenſual Pleaſure, or Pain, differ only in their Degree: and all ſuch pleaſing Senſations, are attended with an Irritation, ſo far uneaſy, as ſtrongly to prompt Perſons thus affected, to gratify them; and when *gratified*, or *increaſed*, terminate either in *Indolence*, or *Pain*.

Hence appears the Reaſon, why in Nervous, delicate Conſtitutions, if the Appetite is not gratified at the uſual Time, it ſoon languiſhes, and is loſt? and why from a continued Faſting, it is at length changed into a total Abhorrence of all Food? The Humours in the Stomach, gradually increaſing their Degree of *Irritation*, and at length acquiring ſuch a Degree of *putrid Acrimony*, as muſt excite a diſagreeable, and painful Senſation.

This Senſation of Hunger, is particularly excited, when the Stomach is moſt empty, either by the Attrition of its Ridges, or Valves, which then approach more nearly to a mutual Contact, or by the *Acrimony* of the Humours, *ſeparated*, or *contained* in the Stomach.

This *Acrimony* has a various Origin; it is either *ſeparated* from the Glands, or exhaling Arteries in the Stomach, and is then of a *ſaline* Nature, (on which Account *Scorbutic* Perſons are generally remarkable for having a great Appetite,) or proceeds from the *acid* Remains of the former Meal, or from the *Bile*; which, when the Stomach is moſt empty, has an eaſier Admittance into the flaccid *Pylorus*: On this Account, likewiſe, Perſons of an *atrabiliarious* Conſtitution, in whom the Bilious Juices are very active, have frequently a great Appetite; which is apt ſometimes to produce dangerous Effects, and to terminate in a *Fames Canina*.

THE *Want* of an *Appetite*, muſt be owing to the *Reverſe* of ſuch Cauſes, as naturally excite Hunger, and therefore proceeds either from a Fault in the *Stomach*, or in the Humours *ſeparated* or *contained* in it.

A *relaxed* State of the Stomach, chiefly ariſing from its having been diſtended beyond its natural Tone, and conſequently a leſs Degree of Senſibility in the Nerves, will make it *incapable* of receiving thoſe *Irritations*, which produce *Hunger*. Phlegm generally abounds in theſe Caſes, which blunts more theſe Senſations: Such Perſons have rather an *Indifference* for Food, than a *Nauſea*, or *Sickneſs*, and their *Digeſtion* is equally impaired with their *Appetite*.

An *original*, or *acquired weak* Texture of the Fibres of the Stomach, will be apt to deprave the Appetite, by being too *irritable*, and liable to diſagreeable, or painful Senſations; which always alter its *periſtaltic Motion*. From the lighteſt Nauſea, to a violent Vomiting, this is only in different Degrees *inverted*; and whenever that is *reſtored*, and becomes regular, all diſagreeable, or painful Senſations ceaſe. Thus Paſſions of the Mind, or the Sight of any ſhocking Object, will often in ſuch Conſtitutions immediately bring on a Sickneſs, and Vomiting; and *Sea-Sickneſs*, in its moſt violent Degree, is originally owing to nervous Irritations, and Spaſms, which invert the Courſe of theſe ſenſible Fibres.

SUCH Conſtitutions, are liable to large *Bilious* Secretions, *Nauſeas*, and Vomitings; and the natural *Mucus* of the Stomach, being then eaſily abraded, their Digeſtion becomes *painful*, and *flatulent*, eſpecially in the Night Time, and frequently prevents their Reſt: Such likewiſe in their Intervals of Health, have a keen, and irregular Appetite, much greater than their Digeſtion, and which frequently renews their Complaints.

THE Humours *contained*, or *ſeparated* in the Stomach, deprave the *Appetite*, when either from an *oppreſſing Viſcidity,* or *pungent Acrimony,* they afford a *diſagreeable,* or *painful* Senſation, and generally ariſe from *Indigeſtion,* a *vitiated* State of the Fluids, or *Errors* in Diet.

Thus the ſolid, conſtitutent Parts of the Stomach, or the Humours ſeparated, or contained in it, may be ſo affected, as to deprave the Appetite; yet they ſeldom ſingly exiſt, but mutually affect each other; however, the Intention of Cure muſt be chiefly directed to the principal, and original Cauſe.

When the Want of an Appetite is owing to a *Relaxation* of the Stomach, ſuch Medicines are required, which by their *Aſtringency,* may gradually brace them up, and by their *Warmth,* increaſe the Contraction of its muſcular Coats, and a greater Influx of *Animal* Spirits: Theſe therefore, muſt be duly proportioned to the Degree of *Relaxation*, which is various; and its firſt Stage may be eaſily relieved: But when the Stomach by frequent Debauches, has been greatly *diſtended*, it will at length, in a great Meaſure, loſe its *contracting Tone*, and become in ſome Degree *Paralytic*, and inſenſible to the ſtrongeſt Irritations, which ſtimulating Medicines can excite: In ſuch difficult Caſes, the moſt powerful Stomachics are neceſſary, and among them the *Bath Waters* of *Somerſetſhire*, juſtly deſerve the Preference, which by their grateful Warmth, Chalybeat Qualities, and Volatile Spirit, ſtrengthen, and animate that relaxed, inactive Bowel.

In theſe Circumſtances no ſtrengthning Medicine can avail, while the Stomach is loaded with indigeſted Humours, the unavoidable Conſequences of that relaxed State; where Phlegm always abounds, and where likewiſe there is either

ther a *Defect*, or *Inactivity* of the *Bile*: On which Account, Medicines which emulate that ſtrong, *natural* Digeſtive, and warm, bitter *Aloetic* Purgatives, are found ſo ſerviceable. Emetics, likewiſe, are often particularly uſeful, not only as they diſcharge any oppreſſing Load, but as an Exerciſe, ſtrengthen, and promote the Contraction of its inactive Fibres, and the Biliary Secretions; but they ought always to be given on an empty Stomach, and during their Operation, large Quantities of Chamomile Tea, or any other Vehicle ought to be avoided, which leave the Stomach in a more relaxed, and diſtended State, and after the firſt Efforts, are with Difficulty diſcharged. This Operation, is better promoted in theſe Caſes, by moderate Draughts of a ſtrong Infuſion of *Horſe Radiſh*, in hot Water, which powerfully attenuates, and diſengages the Phlegm, and warms, and ſtrengthens the Stomach.

I have often known Perſons ſurpriſed after diſcharging a Load of Phlegm by this Infuſion, to find it ſoon after *diſſolved* into Water, with very little Appearance of Phlegm remaining; which muſt be owing to the uncommon *Activity* of its *Volatile Salts*: On which Account, it is often found a powerful Alterative in theſe Caſes, and has been very early recommended as ſuch, by * *Diocles Caryſtius*, in a Letter he wrote to *Antigonus*, one of *Alexander*'s Succeſſors, which is one of the moſt curious Remains of Antiquity, in which he directs to that Monarch, an excellent Regimen of preſerving his Health, in the different Seaſons of the Year, and marks out ſuch Symptoms, as uſually precede approaching Diſorders, and in what Manner they may be moſt effectually prevented.

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* Paul Æginet. ad Finem.

But Temperance, and avoiding *Quantities,* is neceſſary to make any Regimen effectual, without which, the *diſtending* Fibres can never have Liberty to recover their *Spring*; to this *Exerciſe* muſt be added, particularly on Horſeback, which acts as the moſt powerful *Stomachic,* in promoting their Contraction, a greater Influx of animal Spirits, and the compreſſing Force of the contiguous Parts.

Another particular Species of a *depraved Appetite,* and *Want* of *Digeſtion,* will ariſe from a continual Uſe of pure, *Spirituous* Liquors, which will at length, give a *rigid Contraction,* and a callous *Inſenſibility,* to the Coats of the Stomach; this Contraction is likewiſe increaſed by their total Want of Appetite, which prevents them from taking but a ſmall Quantity of Food, and that generally of the ſalted, or ſeaſoned Kind, and they can ſeldom exceed in the Quantity of *Brandy*, or

Spirituous Liquor, which they only chuſe to take, before they are ſtupified for ſome Hours.

SUCH are ſeldom liable to Diſorders from *Plenitude*, or *Indigeſtion*: On which Account, if they are not cut off by ſome inflammatory Diſeaſe, and have not accuſtomed themſelves to this Habit in the *ſecond* Stage of Life, before the Fibres have acquired their full Strength, they often ſurpriſingly live to an advanced Age: But the continued Uſe of ſuch Liquors is always quickly fatal to young Perſons. Hippocrates * ſeems to point out this Cauſe of a Want of Appetite, when he ſays, that *drinking* ſtrong *Wine*, (for ſuch all the *Greek* Wine was) *deſtroys Hunger*.

THIS State of the Stomach, when advanced, is from its own Nature incurable, and is always more apt to prove ſo, as ſuch Perſons ſeldom quit that Habit, when they have for ſome Time purſued it: The *Bath Waters,* are particularly ſerviceable in this Caſe, eſpecially when aſſiſted by the nervous, attenuating *Gums,* Infuſions of *Aromatic* Bitters in Water, and mild, *Aloetic* Purgatives.

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* Sect. II. Aph. 21.

PUNGENT, ſtimulating Stomachics; ought never to be given, when the Appetite, and Digeſtion are depraved, without ſuch Medicines as ſtrengthen the Stomach, and promote Digeſtion; for they only afford a *falſe Appetite,* and are ſoon blunted, and abſorbed by the Food that is taken; while the Stomach by its languid Heat, and Motion, is incapable of digeſting it: Hence crude Indigeſtions in the firſt Paſſages, and Obſtructions in the Viſcera are formed: On this Account, the Cuſtom of *Whetting* in the Morning, has been ſo frequently attended with fatal Conſequences.

When the Appetite is depraved, from *weak,* and too *irritable* a Texture of the Fibres, and Nerves of the *Stomach,* the *milder Stomachics* are moſt proper, which have a moderate Degree of Strength, and Warmth, ſuch as light Infuſions of *Aromatic Bitters,* in Water, the Infuſion of *Mint,* the *Peruvian Bark,* with ſome of its Preparations, the *German* Spa Waters, particularly thoſe taken from the *Pohount* Spring.

Every Thing in Diet, which is acrid, or irritating, and apt to ferment in the Stomach, ought to be carefully avoided; a light *ſolid* Food, agrees better than a more *liquid* one; large diluting, is the frequent Error of ſuch Perſons: Strong, Spirituous Liquors, are particularly pernicious to them. The Red, *French* Wines, which are mildly aſtringent, and warm, of a middle Age, taken in a moderate Quantity, or diluted with Water, are preferable to any other Liquors: Every Thing which is received *too hot*, is particularly injurious to ſuch Stomachs, and the bad Effects of *Tea drinking*, which are often imputed to the *Plant*, are more frequently owing to this Cauſe; for the *glandular Mucus*, which is apt to be deficient, and lightly to adhere to ſuch Stomachs, is eaſily diſſolved, and waſhed away by Liquors much heated: Whence ariſe Heart Burnings, and uneaſy Irritations, particularly in the upper Orifice of the Stomach, attended with Flatulencies, Oppreſſions, and Want of Reſt: In ſuch a State, a Glaſs of cold Water, often gives more immediate Relief, than any Medicine.

EMETICS, are to be avoided in ſuch Conſtitutions, unleſs ſome immediate Oppreſſion, or Irritation, may make them neceſſary; they give indeed preſent Relief, but leave the Stomach more deprived of its natural *Mucus*, its Fibres more irritable, and more diſpoſed to be *inverted*: This too often encourages the Repetition of them, until at length they become incapable of bearing, or digeſting any Food. From theſe uneaſy Irritations, Head-Achs, and many Nervous, and hyſteric Complaints frequently ariſe; as the Stomach is largely ſupplied with *Nerves*, which have their immediate Origin from the Brain, and which at length affect the whole *Nervous Syſtem*. In ſuch Caſes, the lighteſt *Rhubarb*, and *ſaline* Purgatives, agree much better than Emetics, and ſtrengthen the Stomach, at the ſame Time that they correct, and diſcharge any acrid, or bilious, irritating Humours.

In a *Vomiting*, which continues obſtinate, and violent, from the *periſtaltic* Motion of the Stomach being *inverted*, and not from any particular Fault in the

Humours contained in it, next to *Opiates*, no Medicine is more powerful than the *Salt* of *Wormwood*, ſaturated with a proportioned Quantity of the *Juice* of *Lemons*, and taken in the very Act of *Efferveſcence*: This was a Secret of *Reverius*, by which he had increaſed his Fame, and Fortune. In many difficult Caſes, I have found that the prudent Uſe, and Repetition of it, has been ſucceſsful, when other Medicines have failed. When its Efferveſcence ceaſes, this peculiar, *antiemetic* Virtue is loſt; but it then contains all the Qualities of the *ſaline* Mixture, as a cooling Deobſtruent, and Corrector of *bilious* Acrimony.

Is not the Operation of this Medicine, owing to the peculiar Motion, which attends ſuch Bodies in a State of Efferveſcence? which, on a careful Obſervation, appears to be in an uniform Manner, at equal Diſtances enlarging itſelf from the *Center* to the *Circumference*, and by that Means *changing*, and *reſtoring* the inverted Order of the periſtaltic Motion? and is not the *immediate* good Effect, which *Bath* Waters often produce, owing in ſome Meaſure, to a Motion of that Kind?

HENCE it appears, that ſome Medicines, by the Humours which they meet in the Stomach, may improve the Appetite, which would otherwiſe be injurious to it: Thus *Salt* of *Wormwood*, given in Subſtance, when it meets with an *Acid* in the Stomach, to correct it by its oppoſite Qualities, and to promote an Efferveſcence, becomes an *uſeful Stomachic*, which when taken on a tender, empty Stomach (as it ſometimes happens) acts as a *painful Cauſtic*.

HENCE it is evident, that the Stomach may be affected from various, and different Cauſes, and that what is a grateful Stomachic in ſome Caſes, may become prejudicial in others. Thus the *Elixir* of *Vitriol*, which in a relaxed, phlegmatic, and leſs ſenſible Stomach, is a uſeful, and grateful Medicine, would excite violent Pains, and Sickneſs, if given to a tender, irritable Stomach, eſpecially when deprived of the glandular *Mucus*.

CHAP.

CHAP. II.

Of the Second Digeſtion.

THE Chyle, though thus prepared by the firſt Digeſtion, is ſtill ſo crude and indigeſted, and retains ſo much the original Nature of the Aliment, that it is admitted but ſlowly into the Blood by the *ſubclavian* Vein, and in ſuch a Quantity only at a Time, as can overcome the Reſiſtance of its Valve, and the Preſſure of the Blood on it: It then begins to receive immediate Changes from this new Motion, and the Mixture of the Blood, and ſoon arrives to the *right Ventricle* of the *Heart*, and

Lungs, where it acquires more material Alterations.

The Time, which is neceſſary for finiſhing the *firſt Digeſtion* is various, according to the *Nature* of the Food, and Strength of the Conſtitution: Liquids ſoon paſs through it, and are received into the Blood more unaltered; and the more ſolid the Food is, the longer Time is required *. It appears from ſeveral Experiments, that common, ſolid Food, in a healthy Perſon, is in the Space of ſix Hours, entirely diſcharged from the Stomach, changed into *laudable Chyle*, and begins to flow into the Blood. *Lower* †, aſſiſted by theſe Experiments, ſhews that in two Hours after the Chyle is received into the Blood, it is changed into

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* Vide *Wallai Epiſtolum primam ad Bartholin, de Motu Chyli, et Sanguinis.*

† *De Sanguinis Motu et Calore.*

Milk, and circulates through the Veſſels in that Form; and in two Hours more, by the continued Force of the Heart, and Veſſels acting on it; but particularly thoſe of the *Lungs,* it is changed into *Serum*; which is a *perfect Animal Fluid,* and contains all the Materials, neceſſary for repairing the *Solids,* and *Fluids* of the Body.

THE Chyle, received into the Blood by the ſubclavian Vein, muſt unavoidably in the common Courſe of Circulation, paſs through the *Lungs,* before it circulates through any Part of the general *Arterial* Syſtem. They may be therefore juſtly conſidered as the *principal Organ of the ſecond Digeſtion,* and chiefly inſtrumental in changing the Chyle into Serum; for the compreſſing Force of their Veſſels, being particularly increaſed by the Weight of the Air, contributes to give a greater Attenuation, and a more powerful Mixture to the Fluids, than they can receive from all the other Veſſels of the Body; and by the *ſame Preſſure* of the Air, the Form of theſe Veſſels is likewiſe ſo *altered*, that the unprepared *chylous*, or *milky* Humours, which would otherwiſe be unfit to enter the minute Veſſels, which are at length to be nouriſhed by them, are obliged to circulate in the *Pulmonary* Veſſels, through Paſſages as narrow as any, in the moſt minute Capillaries of the Body; for the Diameter of a ſanguiferous Artery in the Lungs, before it terminates in a Vein, is ſo ſmall as ſcarce to admit of one Globule of Blood to paſs through it, without being compreſſed into an *oval Form*, but by the *Preſſure* of the inſpired Air, this *Canal* is from a *circular*, changed into an *ellipitical* Figure, by which Means the circulating Fluid, is obliged to move through Paſſages, which are, by ſuch an Alteration, rendered much more narrow,

row; ſince the *Diameter* of a Veſſel decreaſes in Proportion, as it recedes from a *circular Form*: Theſe *ſanguiferous Arteries* likewiſe in the Lungs, (as in all other Parts of the Body) end in Arteries, which convey *Serum*, and theſe probably into others of an inferior Order; and ſince by the ſame Preſſure of Air inſpired, theſe minute, circular Canals, muſt be made much leſs, by being forced nearer to a *plane* Figure, it from thence evidently follows, that whatever Fluid has received the repeated Actions of this Organ on it, muſt be greatly altered, and attenuated, and capable of circulating through the ſmalleſt Veſſels of the Body.

From hence it appears, that the Effects of improper Diet, and indigeſted Chyle, will be firſt perceived in the Veſſels of the *Lungs*, through which it muſt paſs, before it is received into the left Ventricle of the Heart, and is diſtributed through the whole arterial Syſtem; and from hence likewiſe it is evident, that *Medicines* will arrive to the Lungs, with their Virtues, and Qualities, more *unaltered*, than to any other more diſtant Bowel, to which they muſt be diſtributed through the arterial Syſtem, in much leſs Quantities, and more changed.

As the Lungs are the *principal Organ* of the *ſecond Digeſtion*, I have in the ſubſequent Part of this Work, endeavoured more particularly to explain their Structure, Uſe, and the *Diſeaſes* to which they are incident.

SECT. I.

Of the Tenacity of the Blood.

BY the Aſſiſtance of theſe concurring Cauſes, the Aliment is changed into *Serum*, which however variouſly examined, ſhews not the leaſt Tincture of *Acid*, or *Alkali*, but is of a mild, ſoft, glutinous Diſpoſition, eaſily mixes with Water, is equally tranſparent, and almoſt free from either Taſte, or Scent; if warmed with a gentle Heat it gradually diſſolves, and loſes all its Viſcidity; but if expoſed to a Heat, greater than that which is natural to a Human Body, it acquires a *Tenacity*, and by an increaſed Degree of Heat, becomes at length coagulated; it is then no longer *tranſparent*, but *opaque*, and of a *White*, or *Buff Colour*. If agitated with the ſame Degree of Heat, which is natural to the Body, without a new Supply, it will become *putrid*: Spirit of Wine mixed with it, produces a greater Degree of *Coagulation*, than an *increaſed Heat*, with this Difference, that it continues free from Putrefaction.

DR. MARTIN * ſeems to miſtake, when he endeavours to refute the Opinion of ſome † eminent Authors, as having aſſigned too ſmall a Degree of Heat, capable of giving a Coagulation to the Blood, whereas a much greater is required, than ever yet has been experienced in Human Bodies. But it can only be juſtly deduced from their Obſervations, that the natural Heat of the Blood, which is Ninety-two, is not far from the *coagulating Point*, (or beginning *Tenacity*,) which is a Hundred; and it is certain, that this Tenacity increaſes in Proportion, as the Heat riſes above the natural Standard: This is confirmed by Obſervation, and * Experiments in inflammatory Diſeaſes, which have always proved more difficult, and dangerous, in Proportion to the Tenacity of the Blood; neither can circulating Fluids in the higheſt, ardent Fevers, be capable of attaining more than a certain increaſed Degree of Tenacity: The Heart muſt ceaſe to move, long before they can become perfectly coagulated.

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* *De Calore Animali.*

† *Boerhaave Element. Chem.* T. II. P. 275. *Hale's Hæmaſtics*, P. 104.

THE Difference between *Blood,* and *Serum,* ariſes only from a greater *Union* of the *Globules* of *Serum,* for *Leuwenhoeck* † has obſerved, that one *Globule* of Blood, when not ſufficiently compreſſed by the Action of the Veſſels, diſſolves, and ſeparates into ſix *Globules* of *Serum,* and theſe when again *united,* form one *Globule* of Blood; therefore (*cæteris paribus*) the Proportion of Serum to Blood, will be reciprocally, as the compreſſing Force of the Veſſels: On this Account *Exerciſe* changes a *pale,* into a *florid* Complexion, and in a *relaxed* State of the Solids, the Blood degenerates into a *Seroſa Colluvies.*

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* *Dr. Langriſh on Fevers.*

† *Tom* I. P. 32. *Tom* II. P. 3.

HENCE appears the Reaſon of the *Sizyneſs,* or Tenacity of the Blood in all *inflammatory* Caſes, attended with an increaſed Degree of *Heat*; the Blood in the Beginning of ſuch Diſorders, being often perfectly florid, and mixed with a due Proportion of Serum. It is obſervable, that the Surface of *inflammatory* Blood received into a Veſſel, and expoſed to the Air, firſt changes into a very faint Blue, and then into a White, or Buff Colour, which ſeems to ariſe from the ſudden Condenſation of its Particles, eſpecially of the *Serous* Kind, which from their *increaſed Tenacity,* are more eaſily diſpoſed to coaleſce: On which Account, ſuch Blood, when previouſly *ſtirred,* and *mixed* with the Air, or when it flows *leſs* *freely,*

freely, or from a *ſmall* Orifice, and thereby becomes leſs *heated*, and more *divided*, before it is received into the Veſſel, will no longer ſhew that Degree of Tenacity and Colour.

HENCE likewiſe appears the Error of thoſe who propoſe to attenuate ſuch Blood by *ſtimulating*, *volatile Alkaline* Medicines, and *Bliſters*, which, by *increaſing* its *Heat*, and Motion, muſt likewiſe increaſe its Tenacity. This Error is in ſome Meaſure owing to aſcribing the common Properties of Fluids, to the Blood, and the Alterations they receive from mechanic Cauſes acting on them; whereas it is endued with Properties only *peculiar* to this Fluid. The *Tenacity* which it receives from too intenſe a *Motion*, and *Heat*, is very different from that viſcid *Texture*, which ariſes from a Circulation too *languid*, where the *Globules* are more light, and diſſolved, and their Coheſion weaker; whereas in the former State, their *ſpecific Gravity* is *increaſed*, and they are ſo *compacted*, and *preſſed* together, as to become almoſt ſolid, and unfit for Motion.

THE Neglect of this Diſtinction, has been the Cauſe of many Errors; for the Method which is neceſſary to alter that Texture of the Blood, which proceeds from *too great* Motion, muſt be very different from that, which ariſes from a Circulation *too languid*. *Bleeding* largely, diluting with aqueous, ſaponaceous, acidulated Liquors, and *Nitrous* Medicines, can only diſſolve the *inflammatory Tenacity* of the Serum, and Blood, and leſſen the Action of the *Solids*, and conſequently the Heat on the contained *Fluids*, while the *obſtructed*, and *inflamed* Parts are by the ſame Means preſerved from a *Suppuration*, or *Mortification*, the unavoidable Conſequences of a continued, increaſed Preſſure on them.

I HAVE tried various Methods to diſſolve the Tenacity in the Serum, and Blood, from too great a Degree of *Heat*; but found none ſo effectual, as ſuſpending it in the Vapour of warm Water, impregnated with Vinegar.

THE Reaſon which has been often urged, for the Uſe of *volatile Spirits*, and ſtimulating Medicines, in an inflammatory Sizyneſs of the Blood, is, that when taken warm out of the Body, and mixed with them, it continues longer fluid, does not receive as ſtrong a Coagulation as it otherwiſe would: But is not this the ſtrongeſt Argument, which can be offered againſt the Uſe of them in ſuch Caſes? as it is very evident, that the *Coagulation* of the Blood, and its Separation into a *Serum*, and *Craſſamentum*, after it has been received into a Veſſel, is owing to the *Coldneſs* of the Air, and its total *Want* of Motion.

THIS in a certain Degree, is the Caſe in low Fevers, which, by becoming putrid, increaſe the diſſolved Texture of the Blood; neither will ſuch Blood, when received into a Veſſel, have a *White*, or *Buff-coloured* Coat on its Surface; but appears with a darker, Red Colour, forming a more looſe *Coagulation*, and more ſlowly ſeparating into *Serum*; neither will *Serum*, when it acquires a putrid Diſſolution, coagulate by an increaſed Degree of Heat. In ſuch Circumſtances *Bleeding*, and ſuch *Evacuations*, as may depreſs the Conſtitution, are to be avoided, except in the Beginning, and where a *Plenitude*, or ſome particular Circumſtances require them: The chief Safety is in an *antiſeptic Regimen*, moderately warm in the firſt Stage, increaſing its Force, and the Blood's Motion, by prudent Degrees; guarding at the ſame Time the *Brain*, by *Bliſters*, until *Nature*, thus *ſupported*, and *defended*, can free herſelf by a *Criſis*.

CHAP. III.

Of Urine, and the Diſeaſes of the Second Diſcharge.

THE ſuperfluous, and what may be termed the *excrementitious* Parts of the Chyle, and which remain after it is changed into Serum, and the *ſecond Digeſtion* is finiſhed, are diſcharged by Urine, which is the *ſecond Excretion* from the Body.

ALL Urine conſiſts of *Water, Oil, Salts*, and Earth, and their Difference ariſes from the different *Combinations*, and Degrees of *Heat*, which they received in the Body.

THE Urine, which is ſeparated, in a healthy State, before the *firſt*, and *ſecond Digeſtion* are finiſhed, is *crude*, and in *larger Quantities*, if much diluting Liquids are taken; but if the *ſecond Digeſtion* has proceeded regularly, and is compleated, it is more *high-coloured*, and *concocted*, from its component Parts being more equally *mixed*, and *united*, and therefore do not eaſily, or ſoon *ſeparate*, but depoſite a *light White Cloud*.

HENCE appears the Reaſon, why Children affected with Worms, and Women in their firſt State of Pregnancy, in whom the firſt, and conſequently the ſecond Digeſtion are deficient, generally make *crude Urine*, with a *whitiſh Sediment*? and why Perſons of a relaxed Syſtem of Veſſels, and particularly of the *Lungs*, in whom the *Serum* is not rightly *aſſimilated*, ſeldom diſcharge *concocted* Urine, but ſuch as ſoon depoſites a *large*, *foul* Sediment?

The Urine which is ſeparated from *Serum*, not *recently* formed, nor *diluted* with freſh Liquids, becomes more *acrid*, and *high-coloured*, than *concocted* Urine, and leſs in Quantity; and the *abraded* Parts of the Solids generally *ſubſide* in it, eſpecially if it has been previouſly agitated by much Exerciſe.

These are the general Appearances obſervable in the Urine of Perſons, from a *good*, or *weak Digeſtion*, or from the *Want* of *new Supplies*; and as the Urine is immediately ſeparated from the Blood, it may, if rightly attended to, in a great Meaſure not only determine the Defects of the *ſecond Digeſtion*, but the *Alterations*, which the Blood receives from *different Diſeaſes*.

As there is a remarkable Analogy between the *firſt*, and *ſecond* Digeſtion, ſo likewiſe, there appears the ſame between their ſeveral *Excretions*: From the former not only the *concocted Remains* of the Aliment are diſcharged, but whatever is *received*, or *ſeparated* in the *Inteſtines*, which might be *injurious* to them; by the latter not only the *Remains* of the *ſecond Digeſtion*, but the moſt *exalted*, *ſaline*, and *oily* Parts of the Blood, and whatever by its *Quantity* or *Quality* may be noxious to it, are there ſeparated by the *Kidneys*, whoſe Structure is admirably contrived, and formed for theſe Purpoſes.

HENCE it appears, that an *Error* in the *firſt Digeſtion* is with Difficulty corrected in the *ſecond*, and that a *vitiated*, or ill-prepared Chyle, will be apt to affect the Organs of the *ſecond Digeſtion*, and particularly the *Lungs*, and *Kidneys*.

SECT. I.

Of the Nature, and Formation of Calculous Concretions.

IT is very evident, that a Defect in the *firſt Excretion*, will be often apt to affect the *ſecond*, as many more putreſcent, exalted Parts abſorbed into the Blood, will be added to the urinary Diſcharge, and be apt to load, and obſtruct the Renal Glands; and it is obſervable, that ſuch who are more particularly liable to *Gravel*, or *Stone*, are generally of a coſtive Habit of Body. This way of Reaſoning, is confirmed by a remarkable Obſervation of *Hippocrates* *, that *ſuch who are naturally ſoluble in the Body, will have the urinary Paſſage free, and no Lodgement in the Bladder, except it is inflamed, or obſtructed.*

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* *De Aere et Aquis, Cap.* V.

These calculous Concretions, are by many Authors attributed to *tartareous, acid* Salts; whereas they are really of a contrary Nature, *terreſtrial, oily*, and *alcaline*, which by their *Size*, and *Acrimony* irritate, and obſtruct the Renal-Glands, and their ſmall excretory Tubes, and form there the *firſt Baſis* of a *Stone*, which is gradually increaſed from *ſimilar* Parts added to it; for all Urine has a *lapideſcent*, or Stone-generating Quality: and if a ſmall Stone is continually ſuſpended in healthy Urine, it will thence gradually acquire *concentric Coats*, and enlarge its Size.

Tartar, or the eſſential Salt of Wine, is of an acid, attenuating, and lightly ſtimulating Nature, from whence *Cream* of *Tartar* is formed; and contains Properties quite the *reverſe* of what are obſervable in a human *Calculus*, however variouſly examined; and like other ſaline

Bodies, which attenuate, and correct an *oily*, and *viſcid* State of the Fluids, gently *ſtimulate*, and keep the Body *ſoluble*, becomes a uſeful Medicine in preventing, and relieving calculous Diſorders: Neither, if the Tartar in Wines was prejudicial, and contributed to form Stones (as is generally ſuppoſed) could they poſſibly depoſite their Tartar, in paſſing through the Veſſels, or excretory Glands of the Kidneys; for it is well known * that this eſſential Salt is never ſeparated from Wines, but when they are in a *State* of *Reſt*, and does not ſubſide like a Sediment; but is equally thrown off, to every Part of the Veſſel which contains them: And when Wine, by a long Age, is too much deprived of theſe Salts, it changes its Colour, and loſes its grateful Taſte, and Flavour.

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* Vide *Boerhaav. Elem. Chem. de Fermentatione.*

THE Formation of Stones in the Kidneys, is one of the moſt remarkable Diſorders which attend this *Excretion*; which may often ariſe from an original, or an acquired bad State of the Kidneys, but more frequently of the *Blood*; for the Urine ſeparated from it, will, according to the different Nature of its Contents, be more particularly diſpoſed to *obſtruct* the *Glands*, and *excretory Tubes*, and to lay the firſt Baſis of a Stone, and its future increaſing Evils.

CRUDE Urine cannot freely furniſh Materials, as it is chiefly *aqueous*; but where the *ſecond Digeſtion* is *imperfect*, the terreſtrial, and oily Parts in the indigeſted Urine being more groſs, and weakly aſſimilated, will more eaſily in their Paſſage through theſe fine Veſſels, depoſite its earthy Parts, which ſoon *abſorbe* the *oily* ones, and eaſily acquire a conſtant Accretion. Perſons of a relaxed

Conſtitution, of an inactive Life, particularly ſuch who are liable to Defluxions, and Catarrhs, and live on a viſcid Diet, are more ſubject to calculous Concretions of that Kind, which are of a *White* Colour, ſeldom *hard*, but friable, as the *oily* Cement is *light*.

THAT Urine, which is ſeparated from Serum, or Blood too much *heated*, and *agitated*, and which contains more *exalted*, and *denſe* Oils, and more *ſubtilized*, *terreſtrial* Parts, will be apt to form calculous Concretions, of a *harder* Texture, and more *brown* Colour: Such generally have a ſtronger Conſtitution, live on a higher, and more luxurious Diet, and uſe Spirituous Liquors more freely, and their Urine being thence more acrid, irritates, and contracts the urinary Tubes, and makes them more liable to *Obſtructions*.

It is evident from various Experiments made on human *Calculi*, that they chiefly conſiſt of *terreſtrial* Parts, cemented by *oily* ones, and their Hardneſs will be always proportioned to the *Strength*, or *Denſity* of the *oily*, and the *Minuteneſs* of the *terreſtrial* Parts. This is farther confirmed from the Manner in which *Lythontriptic* Medicines operate, whoſe Force depends on the *Minuteneſs*, and Activity of their Parts, which makes them capable of *pervading* ſuch Subſtances, and of *attenuating*, and changing the Nature of their *oily* Parts, which can only ſupport their *Coheſion*; for their Virtues cannot proceed from any *ſpecific Qualities*, as *Spirit* of *Nitre*, which is the only *ſolvent*, and *Spirit* of *Salt*, a powerful *Lythontriptic*, are both of the *higheſt acid* Kind, and *Lime Water*, eſpecially that made from *Sea Shells*, and recommended by the ingenious Dr. *Whyt*, which contains the moſt *minute*, *ſubtilized* fiery Particles, and *alcaline* Properties, is likewiſe found by Experience, to be a uſeful, and powerful *Lythontriptic.*

As *Lythontriptic Medicines* have evidently *oppoſite* Qualities, yet produce the ſame Effect, they can therefore by no means determine the State of the Kidneys, Blood, or Urine, which gave the *firſt Diſpoſition* to ſuch Concretions, or afford any rational Indications in preventing, or curing them in the *firſt Stages.* Theſe are chiefly to be deduced from ſome evident Error in Diet, or in the *ſecond Digeſtion*, without which they are ſeldom formed, eſpecially if there is no Defect in the *excretory Organ.*

SECT. II.

Of the Defects of the Second Diſcharge.

WHEN this ſecond Excretion is deficient, through the Kidneys, and their excretory Tubes, either from being compreſſed by Tumors, or obſtructed by calculous Concretions, the *retained Urine* will variouſly affect the Body; according to its *Quantity*, and *Acrimony*: Hence often ariſe anaſarcous Swellings, Extravaſations in ſome of the internal Cavities, ſpaſmodic Pains, and particularly in the Head, cutaneous Eruptions, and Sweats, which indeed are rather to be conſidered as a critical Diſcharge, than a Diſeaſe: A *total Suppreſſion* muſt unavoidably end in Death, always preceded by a Sickneſs in the Stomach, Vomiting, Hickup, convulſive Motions, and Lethargy.

thargy. *Carolus Piſo* * mentions a ſingular Caſe of one who lived thirty Days, and recovered; but during the whole Time, he had very profuſe Sweats, attended with a ſtrong *Urinary* Scent. He afterwards relapſed, and died. On opening the Body, two flat Stones were found in the Pelvis, of the Shape of Dates, which entirely ſtopped up the Opening into the Ureters, and muſt have changed their Situation into a more oblique Direction, when he had recovered from the former Suppreſſion. With that View, ſome have not improperly adviſed to invert the Poſition of the Body, and at the ſame Time, by ſhaking it, to endeavour to alter the Direction of ſuch Stones; or by ſtrong Emetics, to change their Situation. I viſited a Gentleman, whoſe Caſe I ſhall deſcribe, as it was attended with ſome very uncommon Circumſtances. He was ſuddenly ſeized in the Evening with an acute Pain in the Region of the left Kidney, and had made ſuch a large Quantity of Urine, that he aſked me if *Whiting*, of which he had dined that Day, was a Diuretic. In a few Hours the Pain was ſo very ſevere, that he ſent for me again. By repeated Bleeding, Cliſters, and Anodynes, it became more mild; and the next Morning I found him entirely free from Pain; but from the Time it had ceaſed, he never made any Urine. This total Suppreſſion continued four Days, without any remarkable Complaint, or the leaſt Inclination to make Urine. His Body was kept freely open, various Diuretics were directed, with Bathing, and Exerciſe; but all in vain. On the fifth Day he complained of a Sickneſs in his Stomach, Pains in his Head, and Thirſt: Theſe Symptoms increaſed the next Day, and were ſucceeded by a Vomiting, Hickup, convulſive Motions, and a Lethargy. He died on the eighth Day in the Morning.

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* *De Seroſoa Cullurie.*

Mr. Osborne, an eminent Surgeon, attended him with me, and conſtantly introduced the *Catheter* every Day, and on that preceding his Death, without diſcharging any Urine; but for ſome Hours before he died, the Nurſe-tender had obſerved, that the Sheet under him was wet, from Urine ouzing from him. On opening his Body, the right Kidney was leſs, more hard, and of a paler Colour, than in a natural State, the Ureter belonging to it *oſſified*, without any Cavity, and extended only to within an Inch of the Bladder, where the Place of its former Inſertion was marked with a black ſolid Spot: The left Kidney, and Ureter, were larger than the natural Size; the *Pelvis*, and Ureter, free from any Stone, or Obſtruction; but the Bladder was greatly diſtended with Urine;

ſome ſmall Stones, and a large one, in the Form of a Wedge, with a conſiderable Quantity of Mucus lay near the Neck of the Bladder: Four Stones of a Cubic Form, and nearly the Size of Dice, of a black Colour, and very light, were found in the *Gall Bladder*.

FROM the Progreſs of this Diſorder, it is evident, that the violent Pain, and increaſed Quantity of Urine, were owing to an Irritation of the Kidney, from the Stone put into Motion, and which continued until it was diſengaged from it; but ceaſed when it fell into the *Pelvis*, and entirely ſtopped up the Paſſage into the Ureter. It is probable, that this Stone advanced more forward into the Ureter, while he was in a Lethargic State, and inſenſible of Pain; and that by the Weight of Urine, it was forced into the Bladder, the Night preceding his Death.

I was well acquainted with this Perſon, and though one Kidney muſt have been entirely uſeleſs for ſome Years, yet he enjoyed a good State of Health, and had not been liable to any Complaints, but of the Colic Kind; and theſe neither ſevere, or frequent. It is very probable, that a *total Suppreſſion* ſeldom happens, but when *one* of the Kidneys has been for ſome Time, before incapable of ſeparating the Urine; and that whenever there is a total, or partial Obſtruction in the one, the Defect is generally ſupplied by an increaſed Diſcharge through the other, which prevents the ill Effects, which otherwiſe muſt more frequently attend the Retention of this acrid, excrementitious Humour.

SECT. III.

Of a Diabetes.

AN increaſed Diſcharge of Urine, will ariſe from too great a *Relaxation* of the Renal Glands, and their excretory Tubes, a *Diſſolution* of the Humours, and from whatever *determines* them there in a greater Quantity.

HENCE may be explained the different Species of a *Diabetes*, and what Regimen is moſt ſuitable to each.

AN increaſed Diſcharge of Urine from a *Relaxation* of the Renal Veſſels, is ſomewhat analogous to a Diarrhœa of the Inteſtines; the repeated Uſe of Purgatives will often bring on the one, and a continued Uſe of Diuretics, has been ſometimes obſerved to produce the other *. A Waſte, and Thirſt, muſt be the unavoidable Conſequences of any Diſcharge of the Body, being greater than the Supplies; eſpecially when the Relaxation is ſo great, as to carry off the new alimentary *chylous* Fluids, before they are aſſimilated, and diſtributed to the finer Veſſels of the Body, and which at ſuch Times only will give a *ſweet* Taſte to the Urine.

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* *Willis, de Diabete Sect.* III. *Cap.* IV.

If this Diſeaſe ſingly exiſts, and is not far advanced, it is eaſily cured by *Subaſtringent* Medicines, and a ſuitable Regimen of Diet. The repeated Uſe of Rhubarb, in ſmall Quantities, Preparations of the Peruvian Bark, and the Elixir of Vitriol, with *Briſtol* Waters, ſeldom fail of reſtoring Strength to theſe Veſſels.

Though this *general Relaxation* of the Renal Veſſels, has been ſometimes obſerved * to be the only Cauſe of a fatal Diabetes; yet it more frequently is owing to a preternatural State, and increaſed Size of the Kidney, from large calculous Concretions, which have totally obſtructed a great Part of their Glands, and excretory Tubes; and by that Means produced a greater *Dilatation* in thoſe which remained free, and capable of giving Paſſage to the Urine. Inſtances of this Kind, have been frequently *obſerved* *, and may be eaſily diſtinguiſhed from the former, as they have been always attended with violent *Nephritic Symptoms*, and generally proved fatal.

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* Vide *Bonet de Diabete.*

Another principal Species of a Diabetes, may originally ariſe from a *peculiar Diſſolution* of the Humours, which *determines* them to the Kidneys. Dr. *Mead* †, with his uſual Judgment, and Sagacity, early pointed out the Liver as the diſtant, and *latent* Seat of this Diſeaſe: But the Progreſs of it will be different, ac-

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[*] Vide *Ballon. Ephein et Epidem. Lib.* II. P. 152. *et Bonet De Diabete, Lib.* III. *Sect.* XXIV.

[†] *Eſſay on Poiſons.*

cording to the *Degree* in which the *Bile* is *vitiated*, and the *Quantity* received into the Blood. The *Cyſtic* Bile is very different from the *Hepatic*, and acquires its Bitterneſs, and more active Properties, from ſtagnating for ſome Time in the Gall Bladder; and from a Mixture of a Glandular Humour, ſeparated from its internal Membrane. The Motion of it from thence into the *common Duct*, is not *conſtant*, but chiefly promoted by the Preſſure of the Stomach when full, and when it is moſt neceſſary for Digeſtion; and by *Spaſms* in a diſeaſed State of the Body. The Secretion of the *Hepatic* Bile, and Motion through the excretory Canals into the *Porus Biliarius*, and from thence through the *common Duct* into the Inteſtines, is *regular*, and *conſtant*: Its Taſte in an healthy State is mild, and almoſt inſipid. By being *vitiated*, it becomes more acrid, and ſaponaceous; and by *ſtagnating*, is in ſome Conſtitutions apt to degenerate into a *ſweetiſh faint Taſte.*

WHENEVER ſuch vitiated Bile is obſtructed in its natural Courſe, and received into the Blood, it will by its active, and ſaponaceous Qualities, *diſſolve* its Texture, and produce a *milder*, and more *imperfect Species* of a *Diabetes.* This is frequently the Caſe of Perſons of a languid, ſcrophulous Conſtitution, in whom Perſpiration is diminiſhed, or has been ſuddenly ſuppreſſed, attended with a Decay, a coſtive Habit of Body, and a Defect of Bile in the Inteſtines. But when, in the Progreſs of this Diſeaſe, *Glandular Abſceſſes* are formed, eſpecially of the *ſteatomatoſe* Kind, the bilious Humours *ſtagnating* in them, become more *vitiated*; and the more active Parts, abſorbed into the Blood, will, like an *alcaline Lixivium*, totally *diſſolve* the Texture of it, and produce the moſt *rapid Diabetes*, attended with a quick Waſte, Thirſt, and a dry Contraction of the finer Veſſels of the Body. I have ſeen ſome Inſtances of this Diſeaſe produced from *Glandular external* Tumours of the ſame Kind, which degenerated into a large, imperfect Suppuration.

THIS Species of a Diabetes is always dangerous, and generally fatal, unleſs its Progreſs is timely prevented. Medicines, which diſengage Obſtructions in the *Liver*, and promote the other Excretions, are chiefly to be depended on, with ſuch as are antiſeptic, dilute, and correct the *peculiar Acrimony*, of the Humours. *Briſtol* Water, medicated Wheys, and particularly that made with Alum, deſerve a principal Place.

ANOTHER Species of a Diabetes, will ariſe from *Nervous Spaſms*, which are uſually preceded by a Coldneſs, and a *ſuppreſſed Perſpiration*. An increaſed Evacuation, muſt be the neceſſary Conſequence of this *contracted State* of the arterial Syſtem, which is generally determined to the *Kidneys*, through which the fineſt, and moſt diluted Parts of the Humours can only paſs freely; on which Account, the Urine is limpid, not ſweet, but inſipid. This *ſpaſmodic* Diabetes is ſeldom permanent, but ceaſes whenever the Irritation is removed, and Perſpiration reſtored. Opiates, volatile, nervous Medicines, ſeldom fail of producing that Effect. However, frequently returning, and *violent Spaſms* of the *Renal* Veſſels, will be apt at length to deſtroy their *Spring*, and to give a *contrary* State, and a total *Relaxation* to them. Dr. *Willis* * gives two remarkable Inſtances of this Kind. In every Species of a Diabetes, where the Kidneys are not originally engaged, *Subaſtringents* become neceſſary, to guard againſt a *Weakneſs* in the *Renal* Veſſels, which muſt be the Conſequence of a *continued, increaſed Flux* of Humours through them.

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* *De Deabete.*

CHAP. IV.

Of the Nature of Aliments, Animal, and Vegetable.

FROM this Account of the firſt, and ſecond Digeſtion, and the Excretions peculiar to them, it is evident, that the Preſervation of Health in different Conſtitutions, and the Cure of many Diſeaſes, will principally depend on a *Regimen* of *Diet* ſuited to them; and as many Complaints ariſe from a Neglect of it, and which are more obſtinate, as they are every Day renewed, I ſhall dwell the longer on this *material* Article.

THE great Difference between a *ſtrong*, and a *weak* Conſtitution, is, that the former can *aſſimilate* Food of a difficult Digeſtion into an healthy Serum, and diſcharge the ſuperfluous Quantities, while the other is oppreſſed, and variouſly affected by it; but may, under a proper Regimen, enjoy as much *Health*, and Freedom of Spirits, though leſs *Vigour*, than one of a ſtrong Conſtitution.

DR. CHEYNE has laid it down almoſt as a fundamental Principle, that a *vegetable* Diet is the moſt proper Regimen for *Valetudinarians*, and the moſt effectual means of removing the various Complaints, to which ſuch Perſons are liable: Perhaps the Relief which he found from it in his own Caſe, might have contributed to this Error; for his Conſtitution was naturally of the robuſt Kind: But I think it will evidently appear from the Principles laid down, that a *vegetable Diet* is moſt improper for *Valetudinarians*, (ſuch I mean as may be juſtly termed ſo, from a weak, and relaxed Syſtem of Veſſels) and chiefly proper for Perſons of the *ſtrongeſt Conſtitution.*

I EXCEPT *Milk* from this Diet, which is of a *mixed* Kind, neither entirely *vegetable*, or *animal*; but conſiſting of the concocted Juices of the Animal, from which it is received, and of the vegetable Aliment; which having paſſed through the Changes of the *firſt*, and partly of the *ſecond* Digeſtion, is therefore eaſily aſſimilated into *Serum*, and retains ſo much of an *aceſcent* Nature, as is ſufficient to prevent that Diſpoſition, which all animal Fluids have to Putrefaction. This is certainly a well-prepared Diet for Valetudinarians, in whom the firſt, and ſecond Digeſtion are deficient, and will likewiſe ſufficiently nouriſh Perſons of a ſtrong Conſtitution. The Praiſes which *Homer* * gives to Milk, are very remarkable, where he mentions the *Hippomolgians* as *Milk Eaters, long-lived, and the juſteſt Men*: Had they changed their Diet, they would not perhaps have deſerved that Character, nor have enjoyed the greateſt Happineſs which can attend long Life, *Mens ſana in Corpore Sano*; and if what ſome Commentators have obſerved, is true, the *Scythians* were deſcended from the *Hippomolgians*, whoſe Manners, and Diet, as deſcribed afterwards by *Hippocrates* *, were then very different from their primitive Anceſtors.

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* Γλακτοφάγων ἀβίων τὲ δικαιοτάτων ἀνθρώπων. Il. Lib. XIII.

The ſole Intention of Diet, is to preſerve a healthy Body in the ſame State; and therefore its *Quantity*, and *Quality*, muſt be proportioned to the Strength of the Conſtitution, and the *Loſſes* which are ſuſtained by the *Abraſions*, and *Excretions*.

On this Account, all Diet will be of difficult Digeſtion, not only in Proportion to the *Vicidity* of its Juices, and the

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* *De Aere et Aq.*

Hardneſs of its ſolid Parts; but to its *oppoſite Qualities* to animal Fluids; as the firſt Digeſtion chiefly conſiſts in *ſubduing*, and *attenuating* the Aliment into a fluid Chyle, and the ſecond in *aſſimilating it* into *Serum*, and *Blood.*

All Vegetables, except a few which are *warm*, and *active*, and have a *volatile* Salt; and therefore are more juſtly ranged among Medicines, than Diet, contain *cold*, *aceſcent*, *viſcid* Juices, and require a long, and a ſtrong Digeſtion, to be *aſſimilated* to animal Fluids: The *Fruits*, and *Seeds* of Vegetables are more ripened, and *concocted*, and more eaſily nouriſhing, and when *Grains* are prepared by *Triture*, and the *Fire*, they become more *digeſtible*; eſpecially when the *Viſcidity* of their Parts has been attenuated by a previous *Fermentation*, which makes *Bread* the moſt ſtrengthening, and beſt Diet of the vegetable Kind. However, all theſe contain *fixed, acid Salts,* and *crude* Juices, quite oppoſite to the Nature of animal Fluids, and of *volatile, alcaleſcent* Salts, to which they can be only changed by a *long,* and *ſtrong* Digeſtion.

On this Account, *Granivorous* Animals are formed with *long Inteſtines,* with various *Circumvolutions,* and the *Valves* in them, and likewiſe in the Stomach, run in a *tranſverſe Direction,* which contributes to give a longer Delay to the Aliment, that it might receive a greater Attrition, and the gradual Changes, neceſſary to aſſimilate it into an animal Nature. Whereas *Carnivorous Animals* have ſhort *Inteſtines,* without any Circumvolutions, fewer Valves in them, or in the Stomach; and theſe *not tranverſe,* but *longitudinal*; as leſs Time is neceſſary to digeſt their Aliment; and which, if longer retained, and more highly exalted into a putrid State, would become fatal to them.

From the ſimilar Structure of the Stomach, and Inteſtines in human Bodies, I think it may be reaſonably concluded, that an Aliment of the vegetable Kind, was originally deſigned as moſt proper for them; and as far as we can learn from ſacred, and profane Hiſtory, it was the principal, if not the ſole Food of the firſt Inhabitants of the Earth; but the Race of Mankind ſoon degenerated, and to their ſucceſſive, and more feeble Offſpring, Animals became a neceſſary Part of Food; eſpecially to ſuch, who by Sloth, or Diſeaſes, were incapable of aſſimilating a vegetable Diet. However, a great Part of Mankind, ſtill ſubſiſt on a vegetable Diet, and have more Health, and Freedom of Spirits, than theſe of the ſame Conſtitution, who uſe too freely an animal Food; for Providence has wiſely ordained, that a vegetable Diet chiefly falls to the Share of the moſt ſtrong, and laborious.

The Fluids of an animal Body, are naturally neither *acid*, or *alcaline*; and though the Diet be entirely of an *aceſcent* Kind; yet by no chymical *Analyſis*, or any other Experiment, can any *acid* Salts be thence obtained. *Homberg* *, and ſince ſome of the later Chymiſts, have endeavoured to prove, that an *acid* Spirit, or Salt, can be ſeparated from animal Bodies, and Fluids: But what has been obtained in ſome of theſe Experiments, may probably ariſe from the *Sea Salt*, which, from its rigid Qualities, paſſes unaltered through the Body; and in others, from the *univerſal Acid* in the Air, which in theſe tedious Proceſſes, may be abſorbed into ſuch Subſtances: But granting the Concluſions deduced from theſe Experiments to be juſt, they only ſhew a *very latent Acid*, and which never appears in the natural State of animal Fluids.

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* *Memoires de l' Academ. de Sciences, Ann.* 1711. 1712.

From hence appears the Error of the prevailing *Hypotheſis* in many antient, and modern Authors, that the *Gout*, *Rheumatiſm*, *Scurvy*, and ſeveral *chronic Diſorders*, ariſe from an *acid Acrimony* in the Fluids; and that the various Medicines, which have been eſteemed as *Sweetners*, and *Alterants* in ſuch Caſes from their *alcaline* Qualities, can only operate as ſuch in the firſt Paſſages.

In an healthy State, the Serum, and the Fluids ſeparated from it, are only of an *alcaleſcent* Nature, and muſt inevitably deſtroy the Veſſels, and bring on Death, before they can become perfectly *alcaline*. The mildeſt putrid Fevers, and ſcorbutic Diſorders, differ from the *Plague*, and the *Scurvy* deſcribed in Lord *Anſon*'s Voyage, only in different Degrees of *Putrefaction*, or nearer Approaches to an *alcaline* State.

As animal Fluids, from Heat, and Motion, have therefore a natural Tendency to Putrefaction, they would ſooner approach to that State from an animal Diet, unleſs corrected either by *Acids, Salts, fermented Spirits, and Aromatics,* which are the chief Preſervatives againſt it.

Dr. Pringle * has improved this Part of Medicine, by ſeveral accurate Experiments, and Obſervations; and has not only greatly enlarged the Claſs of *Antiſeptics,* but has likewiſe ſhewn, that volatile, alcaline Salts, which were formerly ſuppoſed to promote Putrefaction, are really powerful Antiſeptics.

However, it is evident, that though *Heat, Moiſture,* and a *ſtagnating Air,* greatly accelerate Putrefaction in *dead* Fleſh;

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* *Appendix to Obſervations on the Diſeaſes of the Army.*

yet a greater Degree of Heat, which *hardens* the Fibres, and *exhales* the Moiſture; and a continued Wind, which *diſſipates* it, will prevent Putrefaction; not by any real *antiſeptic* Quality, but by rendering ſuch Subſtances, no longer liable to Putrefaction: On which Account, all *warm*, and *aſtringent* Subſtances, muſt in *inanimate* Bodies, prove antiſeptic, and be more powerful, when they contain a particular Balſamic, or *oppoſite* Quality to Putrefaction. Thus Beef cut into ſmall Slices, is preſerved in hot Climates; dead Bodies buried in dry, hot Sand, have been found free from Putrefaction; and by a *vitrolic* Vapour, have for many Years continued entire, and firm.

As Antiſeptics therefore of a quite *oppoſite* Nature, prevent Putrefaction in *dead* Fleſh, and *ſtagnating* animal Fluids, it is difficult to determine in what Manner they *operate*, and how *differently* they may act in *circulating* Fluids.

Some of the later Chymiſts, have been fond of conſidering Putrefaction, as the *third Proceſs* of vegetable Fermentation; as the Subſtances which have gone through the former, if they are *left together* in a proper Heat, advance to Putrefaction; but if the vinous Part, is ſeparated from the *Fæces,* it will continue free from it; neither is a previous *ſpirituous,* or acid Fermentation, by any means unavoidably neceſſary to Putrefaction; for as certain Subſtances fall into the *acetous,* without having gone through the *ſpirituous* Fermentation; ſo others begin to putrefy, without having gone through either, of which laſt Kind are moſt *Animal Subſtances*: There ſeems therefore to be rather a remarkable Analogy between the *Fermentation* of Vegetables, and the *Putrefaction* of animal Fluids; as the Effect of this *inteſtine* Motion in each, is to diſſolve the Union of their Parts, and to produce a new Combination of ſuch, as did not exiſt before.

From the *ſpontaneous* Motion, and Fermentation of the former; an *ardent Spirit*, or *acetous* Liquor, is produced; from the latter, alcaline, volatile Salts, and a *putrid* Spirit; and the different Degrees of theſe Productions depend chiefly on the greater Degree of inteſtine Motion, which, from the Nature of their component Parts, they are capable of attaining to. Salts, even of the alcaline Kind, ſeem to be incapable of Putrefaction; the *oily*, and *ſulphureous* Parts of Bodies, are chiefly ſubject to it. Volatile, alcaline Salts therefore, though the Product of Putrefaction, by dividing, and attenuating ſuch viſcid Subſtances, and giving a quicker Diſcharge to their more active, and fugitive Parts, may ſometimes prevent that Degree of Putrefaction, which otherwiſe they would acquire; and it is obſervable, that in putrifying Bodies, from whence the moſt noxious, and *putrid* Vapour is emitted, there is always a Deficiency of volatile, alcaline Salts; or at leaſt they are not eaſily extricated during that State.

How far, and in what particular Caſes, ſuch Subſtances may prove antiſeptic in animal, circulating Fluids, can only be determined by Experiments, and Obſervations; as they are only ſuſceptible of a weaker Degree of Putrefaction, and from Cauſes *different* from thoſe, which produce it in ſtagnating Fluids, and dead Fleſh.

ANIMAL Fibres, and circulating Fluids, cannot, like dead Fleſh, be rendered incapable of Putrefaction by Heat, and Aſtringents, and diſſipating their Moiſture; neither are they capable of acquiring Putrefaction from that inteſtine Motion, peculiar to it, except in *Abſceſſes, Ulcers,* or extravaſated *ſtagnating* Humours: It has been already obſerved, that animal Fluids are only alcaleſcent; that Life muſt be deſtroyed before they can acquire a perfect putrid, or alcaline State; and that this Diſpoſition to Putrefaction, is chiefly prevented by new Supplies, of an antiſeptic Kind: But though the Humours are thus corrected, and recruited, they may acquire a certain Degree of Putrefaction, from a Circulation too *languid*, or too much *increaſed*. In the former Caſe, the volatile, alcaline Salts, and the more warm aromatic Antiſeptics; in the latter, the Acid, or neutral Saline, and refrigerating, will be found moſt effectual in preventing its Progreſs.

ANOTHER more powerful, and frequent Cauſe of Putrefaction in animal Fluids, will ariſe from a *Retention* of the *Excretions*; all which are of the *putreſcent* Kind. *Urine*, from ſeveral Experiments, appears to be highly of that Nature; but the *Matter of Perſpiration* muſt be capable of acquiring a greater Degree of it; and when retained, like a *putrid* Ferment, quickly contribute to promote Putrefaction. Hence that remarkable *Fætor* in *Sweats,* after a long ſuppreſſed Perſpiration: In this Caſe, whatever *reſtores* the *Excretions,* will be the beſt *Antiſeptic.*

HENCE it is evident, that if Fiſh, and ſeveral Sorts of wild Fowl, which live on an animal Diet, are taken for Nouriſhment, they will be more apt to give a *putrid* Diſpoſition to the Fluids, than the horned Cattle, Sheep, and tame Fowl, who live on Vegetables, and afford a more temperate Food than the former.

THIS Way of Reaſoning, was confirmed by an Experiment made on a Soldier, who was hired to live entirely for ſome Days on wild Fowl, with Water only for Drink: He received in the Beginning his Reward, and Diet, with great Chearfulneſs; but this was ſoon ſucceeded by a Nauſea, Thirſt, and a Diſpoſition to a putrid Dyſentery, which was with ſome Difficulty prevented from making a farther Progreſs, by the Phyſician who tried the Experiment.

From hence it is evident, that *Sea* Salt, in a ſufficient Quantity, is a uſeful Corrector of an animal Diet; and in that Reſpect an *Antiſcorbutic*: It may, from an Exceſs, and not being ſufficiently diluted, give a peculiar *Muriatic* Acrimony to the Fluids; but that very ſeldom happens, and is eaſily removed. In Sea-Voyages, that *peculiar Scurvy*, which is imputed to *long living on ſalt Meats*, is really owing to a *contrary* State of the Fluids, and to a *putrid* Acrimony, and *Diſſolution* of them, from the Want of that *Quantity* of *Acids*, or *fermented* Spirits in their Drink, which is neceſſary to prevent that natural Tendency the Fluids have to Putrefaction; and which the *Quantity* of Salt (which is but a weak *Antiſeptic*) is incapable of preventing, and often not ſufficiently powerful, even to preſerve the ſalted Meat from being in ſome Degree corrupted: This Diſeaſe more frequently appears, and in a greater Degree, when their *Bread* is in the ſame State; and when their *Water*, which at the beſt has no *real antiſeptic* Quality, is often in a *putrid* State. In theſe Circumſtances, freſh animal Food, would ſooner bring on an increaſed putrid State, than ſound, and *well* ſalted Meat, unleſs ſome acid Vegetables, or ſpirituous, antiſeptic Corrector, was added to their Drink, and could diffuſe itſelf through the Blood.

I KNEW an eminent Lawyer, who, by the Advice of Dr. *Woodward*, abſtained for ſome Years entirely from *Salt*, drank chiefly Water, and uſed freely an animal Diet, and by that Means acquired a violent

Scurvy: He was in ſome Time relieved by a ſtrict Regimen of Diet, and Medicine; and aſterwards uſed Salt, and Vegetables, with an animal Food, drank Wine more freely, and never had any Return of that Diſorder. I knew another Perſon, who drank nothing but Water, and lived freely on an animal Food; and on aſking him if he was not fond of *Salt*, he ſaid, he generally eat ten Times as much as any one in Company; Nature thus directing him to guard againſt that Tendency, which his Humours had to Putrefaction. In ſeveral Parts of *Guiney*, before Salt Pits were known, no Commodity yielded a higher Price; and the Inhabitants would readily traffic their Gold Duſt for a ſmall Quanity of it. In all Countries where an animal Food is uſed, it is a grateful, and neceſſary Corrector; but eſpecially in very hot Countries, where it muſt be more neceſſary, and valuable; and it is obſervable, that many Perſons take with freſh Meat, as large a Quantity of Salt, as is neceſſary to ſeaſon it, and receive no remarkable Inconvenience from it; for when ſufficiently diluted, it paſſes off unchanged, by Urine.

Hence appears the Reaſon, why theſe who live freely on an animal Food, and drink only Water, acquire thence a *red ſcorbutic Countenance?* the animal Salts in their Blood, being rendered more *active,* and *luxuriant,* from the Want of ſome *acid,* or *fermented, antiſeptic* Corrector in their Drink.

From hence it is evident, that Perſons of the *ſtrongeſt Conſtitution,* who uſe much Exerciſe, can beſt digeſt, and more ſafely live on a Diet of the *Vegetable* Kind, with *Water* for Drink; and that Fruits, Vegetables, or the light, acidulated Wines, are neceſſary, and moſt proper for them.

Hence appears the Reaſon, why Perſons of this Conſtitution, who uſe freely a higher, and more putreſcent animal Food, ſuch as wild Fowl, and Fiſh, are apt to be more thirſty after it, than when they uſe even ſalted, or ſeaſoned Meat? and why Wine in larger Quantities, is then not only more agreeable, but neceſſary; which, though it may heat, and inflame, yet guards their Fluids from Putrefaction?

Valetudinarians, ſuch I mean as are healthy, but of a weak Couſtitution, will require a *mixed Diet,* ſuch as Bread, the milder Animal Meats, moderately corrected with *Acids,* or rather with Wine, plain, and mixed with their Water. Such was *Cornaro*'s Regimen; a *ſolid,* eaſily aſſimilated, animal Diet, guarded equally from *crude Indigeſtion,* and *putreſcent Acrimony*; which is much preferable to a liquid Diet of any Kind, unleſs when the firſt, or ſecond Digeſtion are greatly impaired, or when quick Supplies are not required; as it relaxes the Stomach, and gives a leſs laſting Nouriſhment to the Body. This is agreeable to the wiſe Precept of *Hippocrates* *, *that the Aliment, which is with Difficulty altered, is not eaſily conſumed; and that which is eaſily aſſimilated, is eaſily waſted*: Therefore the digeſtive Powers ought to be exerciſed by a ſolid Food, proportioned to their Strength; which is not only neceſſary to increaſe, and preſerve their Tone, but to give a more firm, and *permanent* Nouriſhment to the Body.

HENCE appears the Reaſon, why acid, and crude Vegetables generally diſagree with weak, and cold Conſtitutions? and why the higher animal Food, and particularly Shell-Fiſh, is often ſo agreeable, and uſeful to them?

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* *De Victûs Ratione.*

From theſe Principles, ſuch Rules of Diet, might likewiſe be eaſily deduced, as are neceſſary to be purſued in different *acute*, and *chronic* Diſeaſes; and if this material Part in the Art of Healing is neglected, the moſt powerful Medicines will be often ineffectual.

CHAP. V.

Of the Third Digeſtion.

WHEN the Aliment is changed into healthy Serum, and then begins to aſſume the Nature of animal *Fluids*, the *ſecond Digeſtion* is completely *finiſhed*: But though it contains all the Materials neceſſary for repairing the Solids, and Fluids, is yet unfit for Nutrition, until it paſſes through greater Changes in the *third*, and moſt important *Digeſtion*, to which the two former are only ſubſervient and preparatory.

THE gradual Alterations which *Rhyſch*[*] has obſerved in the Growth of human Embryos, agree ſo exactly with the Alterations, which *Malpigius* [†] has deſcribed in the Egg, and ſuch a ſurprizing Analogy appears between the *White* of the Egg, and *Serum* of the Blood in an healthy State, that I think a ſhort View of them, will be neceſſary to illuſtrate the progreſſive Changes of this elaborated Fluid, from which all the Solids, and Fluids of the Body are *repaired.*

THE Shell, or outward Integument, proceeds from a Mucilaginous Humour, ſeparated from ſeveral Glands, placed near the *Anus*, which hardens by Degrees, the Egg being entirely ſoft three Days before its Expulſion. Next to this lies a tenacious Membrane, which may be conſidered as the internal *Perioſteum*, or *Dura Mater*; under this lies another Membrane, more tender than the former, like the *Pia Mater*. The Egg has two Angles, the one *obtuſe*, the other more *acute*, with the *Yelk* in the Center: Between this, and the Shell, the *White*, or *Albumen* is placed, which is not a looſe Fluid contained in one Cavity; but conſiſts of ſeveral Series of *concentric*, thin *Membranes*, gradually decreaſing, like ſmall Circles within a large one: Between each of theſe, the *Albumen* lies; in whoſe Center, between the obtuſe *Angle*, and the Yelk, the *Embryo* is placed in a ſmall *Bag*, containing at firſt a ſingle liquid Drop.

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[*] *Theſaur* 6. Tab. I. Fig. 1, 2, 3, 4, 5. Tab. III. Fig. 1, 2, 3, 4.

[†] *De Ovo Incubato.*

THE Hen broods on this Egg, and by her genial *Heat*, the *White* next to her Body, contained between the firſt, and ſecond Membrane, begins to be attenuated, and to move by Degrees into the next; and the Warmth, and Motion being continued, is by progreſſive Undulations protruded through the various *Series* of the concentric Membranes, until it arrives at the ſmall Bag, where it is received by the Embryo for Nouriſhment.

How great the Attenuation of this Humour muſt be, will in ſome Meaſure appear by conſidering the Minuteneſs of the Animal * who receives it; but this Humour, though already greatly attenuated, muſt be yet more ſubtilized, before it is ſufficiently prepared for Nutrition, and circulating through the decreaſing Series of Veſſels, which, though not viſible, are *ichnographically* delineated in the Embryo †, even of the moſt minute Animal: For as yet, there is as great a a Difference between it and the laſt Liquid, which nouriſhes the Embryo, as between the *crude Chyle* in a human Body, and that Fluid which conſtantly evaporates by *inſenſible Perſpiration.*

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* Vide *Leuwenhoeck*, *Tom* III. P. 368.

† *Leuwenhoeck*, *Tom* III. P. 8.

THERE appears to be no Difference between the White of the Egg, and Serum of the Blood; for however variouſly examined, they afford the ſame *Phænomena*; and the Alterations which each receives in being prepared for Nouriſhment, depend on the ſame Cauſes. The Secretion of the former, proceeds from the Heat of the Hen ſitting on it; and if the Heat applied to the Egg, is greater than that which is natural to the Hen, it no longer remains fit for Nouriſhment, but becomes coagulated: Neither will it nouriſh if the Heat be leſs; but if a juſt Degree of Heat, though artifical, be preſerved, the Embryo will be thereby nouriſhed, and brought forth. This Experiment was formerly made with Stoves in *Egypt* *; and has been often ſince ſucceſsfully repeated. In the ſame Manner the Action of the Veſſels produces the ſame Alteration in the Serum in a human Body, as the Heat of the Hen on the White of the Egg; for when this is regular, and equal, it diſſolves to the greateſt Degree of Fluidity, until it is capable of entering, and nouriſhing the moſt minute Series of Veſſels; and as the Fluids circulating through the fineſt Veſſels in the human Body, where Nutrition is chiefly performed, retain no longer a coagulating Quality, but are ſo fine as to exhale; ſo likewiſe the *Albumen*, when prepared to nouriſh the Embryo, by paſſing through the decreaſing Series of Membranes, will by no means coagulate, if expoſed to any Degree of Heat*: Beſides, the Heat of an healthy Man, meaſured by the Thermometer, is equal to the genial Heat of the Hen; and where there is the ſame Degree of Heat in the ſame Bodies, we may ſafely conclude, that there is the ſame Degree of Motion: Therefore the *Serum* muſt be *digeſted*, and attenuated in the ſame Manner in each; for where the Materials, and the phyſical Cauſes are the ſame, the Effects muſt be always adequate to them.

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* *Plinii Hiſtoria Natural, Lib.* X. *Cap.* 45.

† *Bellinus de Motu Cordis, Prop.* VI.

Dr. Martin ſays, that the Heat of the Hen, is greater than that of the human Blood, the former being to the latter as a Hundred to Ninety-two: But it is obſervable, that the Hen often quits her Seat, by which means the Heat communicated to the White of the Egg, does not probably exceed that of the Blood, which is more uniform, and conſtant.

All the Solids of the human Body, take their Origin from the Brain. *Mal-*

Malpigius * has ſhewn, that the Embryo in the Womb, is in Form like a Worm, which firſt conſtitutes the *Spine*, as the Baſis, from whence all the Solids ariſe: Five limpid Drops grow from it, which afterwards form the Lobes of the Brain, from which the two Globes of the Eye next appear; afterwards a bending Tube ariſes, that has three unequal Protuberancies, which by Degrees inclining to each other, form the *Heart*; from whoſe Tendons, *the Veſſels take* their Origin. All the Bowels, Membranes, and Glands, are formed of theſe Veſſels variouſly diſpoſed: The Bones are formed from Membranes, hardening by Degrees to Cartilages, and theſe to Bones; from whence it appears, that the ſolid *Stamina* of the Body have the ſame Origin.

THERE is no Solid, but what is compoſed of ſmaller Parts, exactly like the greater. *Leuwenhoeck* * has diſcovered that the pectoral Muſcle of a Flea, is in Form like the pectoral Muſcle of an Ox; and that the largeſt Muſcles in the Body, are compoſed of ſmaller Muſcles †, which differ only in Magnitude, not in Form. *Malpigius* ‡, and *Havers* §, diſcovered, that the Bones conſiſt of ſeveral concentric Cylinders, the ſame in Form, though gradually decreaſing. The larger Veſſels conſiſt of ſmaller, and the minute Veſſels, which have been diſcovered, and which are much ſmaller than the fineſt Hair, are in their Form like the largeſt ||.

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* *De Ovo Incubato*, P. 71, 83.

A SANGUIFEROUS Artery, before it ends in a Vein, is ſo ſmall as to admit only one Globule of Blood to paſs through it, and then throws of a lateral Branch, whoſe Diameter is one-ſixth leſs, than the

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* *Tom* II. P. 31. † *Tom* I. P. 46, 47. ‡ *Tom* II. P. 214.

§ *Oſteologia nova, Tab.* I. *Fig.* 1.

|| *Leuwenhoeck, Tom.* II. P. 57, 58.

laſt Orifice of the ſanguiferous Artery; and from this ſecond, a third decreaſing Order takes its Origin: The Humours which peculiarly belong to theſe Veſſels, ſeem to decreaſe in the ſame Proportion; for a Globule of Blood is compoſed of ſix Globules of Serum.

THUS far Diſcoveries have been made by Injections, and Microſcopes *; but how far, or in what Manner, this decreaſing Series proceeds, it is difficult to determine: However, it is certain, that the Fluid of Perſpiration, exhales from the laſt, and a finer Order than has yet been diſcovered by Injections, or Microſcopes.

THIS decreaſing Order of the Veſſels, has been objected to by ſome, and particularly by the ingenious Dr. *Haller* †, who ſuppoſes, that theſe of the third Order, take their Origin from the ſanguiferous Artery: But this ſeems to be quite oppoſite to that uniform Diſtribution of the Veſſels, which, as far as Injections, and the Eye can diſcover, is obſervable in all Animals; where the Branches have generally a regular Proportion to the Trunk, from which they ariſe: Among other Arguments to ſupport this Opinion, he aſſigns the Difficulties which muſt attend the ſlow Motion of the Fluids through the third Order, if they had taken their Origin at ſuch a Diſtance from the Heart: But this rather ſeems to be a ſtrong Objection to his Opinion; as that ſlow Degree of Motion is really uſeful, and neceſſary for Nutrition, and ſome of the finer Secretions; and which, if this third Order derived its Origin from a ſanguiferous Artery, could neither be effectually, or ſafely carried on, as a great Velocity in the Fluids, is neither ſuitable to theſe Intentions, or to the Tenderneſs of their Fabric, which probably muſt have been ſoon deſtroyed by it.

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* *Leuwenhoeck*, T. II. P. 204. T. III. P. 219.

† *Primæ Lineæ Phyſiolog. Cap.* III.

This third Order of Arteries, has been generally called *Lymphatic*, from a received Opinion, that the *Lymphatic Valvular* Veins were derived from the inviſible Extremities of them; but the ingenious Dr. *Alexander Monro* * has, from an accurate, and exact Courſe of Experiments, ſhewn, that theſe *Valvular*, lymphatic Veins, are a *particular* Syſtem of *abſorbent* Veſſels, independent of any arterial Communication; ſo likewiſe are the *abſorbent* Veins on the *external* Surface, and, in the *internal* Cavities.

The Quantity of Fluids, greatly exceeds that of the Solids: The Difference between a fat, and a lean Man, chiefly conſiſts in a Collection of inactive Oil in the *Membrana adipoſa*; which, when too much increaſed, oppreſſes the Body, and becomes a real Diſeaſe, which may not improperly be conſidered as a more ſolid *Anaſarca*: Such a one *emaciated* by a Conſumption has ſtill the ſame Number of Veſſels as before, though more waſted, and abraded. This great Diſparity might be likewiſe hence confirmed, that if Twenty-five Grains of the Brain are expoſed to the Air, Twenty-four exhale, and only one Grain of Solid remains: Even the Bones, which are the moſt ſolid Parts of the Body, waſhed often with Water, loſe nine Parts in ten.

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* *De Venis Lymphaticis Valvulis, et de earum Origine.*

WHEN healthy Serum is ſo far gradually attenuated, by the Action of the Veſſels on it, as to be capable of entering the decreaſing Series of Veſſels, the *third Digeſtion* is finiſhed: But as the three Digeſtions are preparatory to Nutrition, I ſhall endeavour, from the Nature of theſe ſolid Veſſels, and the known Laws of Motion, to explain in what Manner it is performed.

SECT. I.

Of Nutrition.

THE ſeveral Canals in a human Body, have new empty *Interſtices*, perpetually made in them, which require a conſtant Repair, by being either *abraded* by *Attrition*, the unavoidable Effect of Motion, or by being *diſtended* by the preſſing Force of the circulating Humours: For ſince all the Lines of a Fluid, moving in a conic Veſſel, from its Baſis to the Extremity of it, are parallel to the Axis of the Canal, all the Points of that Fluid, (except that Cylinder, the Diameter of whoſe Baſis is equal to the laſt Orifice of the Artery) muſt neceſſarily move with a Reſiſtance to their Motion, which endeavours to repel that Fluid with the ſame Force; but the Quantity of Motion given to it by the Heart, being always ſuperior to this Reſiſtance, it will neceſſarily *diſtend* the Sides of that Canal, according to its longer Axis; by which Means it will be likewiſe *widened* in every Part: When this impelling Force of the Heart ceaſes, the diſtended Canal contracts with ſuch a ſuperior Force in its Turn, as is ſufficient to propel the Fluids, and continue their Circulation: From this Action of the Heart, and Re-action of the Arteries, depends that Motion of the Blood, which is obſervable in an opened Artery; and which does not flow in an equal Stream, but in a ſubſultory, interrupted Motion.

THIS Diſtention of the Canals, by which the Parts of them are *ſeparated*, produces the Want of a new Supply in tender Veſſels, and young Animals, more than the Force of *Attrition*; and *cæteris paribus*, the leſs diſtant they are from the Origin, the greater the *Diſtraction* of the

Fibres will be; but it is probable, that in the ſame Proportion this decreaſes, the Force of *Attrition* increaſes; for the more firm any Body becomes, the greater is the Difficulty to *ſeparate* its Parts by Motion; and the more capable it is by the ſame Means to excite a violent Attrition.

HENCE it appears, that a human Body will continue to grow; while the *impelling* Force of the *Heart*, is greater than the *reſiſting* Force of the *Veſſels*, and remains at a Stand, while there is an *Equilibrium* between the impelling Force of the one, and the Reſiſtance of the other. But, as the Veſſels gradually become more compact, and ſolid, they begin in their Turn to get the better of the Force of the Heart: Old Age advances in the ſame Proportion; and (if the Expreſſion may be allowed) the Man grows back again.

Hence the Defects of old Age, are firſt obſervable in the Loſs of the fineſt, animal Faculties; for the Veſſels deſtined for theſe Uſes, as being moſt minute, are firſt compreſſed; a lethargic Indolence ſucceeds in every Part, the Veſſels gradually become more inflexible, until at length their Reſiſtance is ſo great; and the contracting *Force* of the Heart, from its *Rigidity*, ſo weak, that it becomes at length incapable of expelling what it contains, and regularly deſiſts from Motion: Such a one cannot ſo properly be ſaid to die, as that he ceaſes to live.

Hence it is evident, that a human Body muſt gradually be deſtroyed, by the ſame Cauſes which ſupport it; that the more quick the Motion of the Blood is, the ſooner old Age will advance; and that (*cæteris paribus*) the Number of Years, to which all Men may attain, will be in a *reciprocal Ratio* to the Velocity of their Pulſes. Thus allowing 70, or f Years for the common Age of Man, and 60, or b Pulſes in a Minute, for the *common Meaſure* of Pulſes in a *temperate Perſon*; and putting c for the Number of Minutes in a Year, then $c, b, f, =$ 2209032000, the Number of Pulſes in his whole Life: But if another by Intemperance, forces his Blood into ſuch a Motion, as may give 75, or z Pulſes in a Minute, then $\frac{cbf}{cz}=\frac{bf}{z}$ 56, the Number of Years, in which ſuch a one will run out the ſame Number of Pulſes, which, by the former Computation, would laſt to Threeſcore Years and Ten; by which Means he will finiſh his limited Number of Pulſes, or Years, fourteen Years ſooner than otherwiſe; and univerſally $z : b :: f : \frac{bf}{z}$.

THIS Way of Reaſoning, may perhaps appear too abſtracted; but the general Principle from whence it is deduced, is certainly right: Few, perhaps, have ever died of mere old Age; and *Parr*'s advanced Years might have been prolonged, had he not changed his Situation, and uſual Manner of Life: Therefore, the Age of Man ſeems to be *indefinite*; and, if not cut ſhort before its natural Period, by ſome *acute*, or *chronic* Diſorder, will vary according to his original Conſtitution, and Manner of Life. Lord *Bacon* * has obſerved, that the different Age of all Animals, ſeems to be (*cæteribus paribus*) in ſome Proportion to their *Bulk*, and the *Coldneſs* of their Conſtitution. He gives a remarkable Inſtance of this in an Elephant, whoſe natural Age is Two Hundred Years, and his Blood is colder than that of any other Animal †. It is certain, that ſuch who uſe large Exerciſe, or Labour, ſoon contract *Wrinkles*, and early Marks of old Age; and that many more Inſtances are known of long Life in Cloyſters, and eaſy Retirements, where the Mind, and the Body are agreeably, and indolently engaged, than among ſuch, who are exerciſed in the more active, and laborious Scenes of Life.

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* *De Vita et Morte.*

† *Elephantis ſanguis omnium animalium frigidiſſimus eſt.*

HENCE it appears, that the Life of Man, may be naturally divided into *three Stages*; in the *firſt* of which, the Body, from the Nature of its Frame, muſt naturally grow, and be extended; for the Weight of the Heart, in Reſpect to the Weight of the Body, is much greater in young Children, than in grown Bodies; and the Quantity of Blood, contained in the Body, and its Velocity, with Reſpect to the Weight of the Heart, are greater in Children, than in grown Perſons, and leſſen gradually from the Birth, until the Body comes to its full Growth: On which Account, the *Veſſels* of young

Bodies, are conſtantly in a yielding State, and the more ſo, the nearer they are to their Origin. In the Beginning of the *ſecond* Stage, there will be therefore an Equilibrium between the Force of the Heart, and the Reſiſtance of the Veſſels, which, under a proper Regimen, will continue without any great Variation for many Years. In the *third* Stage the Reſiſtance, and Contraction of the Veſſels, gradually increaſe, and *Wrinkles* muſt be the Companion of old Age.

The Diſorders which are chiefly *peculiar* to theſe three different Stages of Life, may be in a great Meaſure explained from the different State, and Changes made in the Solids, which are more yielding, and admit a greater Diſtention, the nearer they are to their Origin; hence, more liable to an *unequal Growth*, a Rupture of the finer *Lymphatics*, *Extravaſations*, and to Hemorrhages, eſpecially when they become leſs yielding, and firſt arrive to their full Extenſion.

HENCE likewiſe may be explained, why many of thoſe Diſorders, which reſiſt the *Virtues* of the *beſt Medicines*, naturally ceaſe in the *ſecond Stage*. This is generally a more permanent, and increaſing State of Vigour, and chiefly liable to *acute Diſorders*, ariſing from irregular Living, or external Accidents: During this Stage, if the Veſſels by frequent Plenitude, or great Intemperance, have been too much *diſtended*, and loſe their Tone, they will become incapable of acquiring a *gradual Contraction*, and conſequently of paſſing through the *third Stage*: Such Perſons therefore generally form ſome fixed *chronic* Diſorder, which either cuts them off between *Forty* and *Fifty*, about the End of the *ſecond Stage*, or elſe they drag on a diſeaſed Life, a few Years longer.

FROM hence it is likewiſe evident, that *Valetudinarians* of a weak, nervous

Conſtitution, who have lived temperate, may recover more firm Health, and a greater Freedom from Diſorders, in the *third* Stage of Life, than they enjoyed in the two former; for their Fibres will *begin* then to acquire a gradually increaſing Spring, and Strength for ſome Years: This is that *Viridis Senectus*, ſo much wiſhed for, and ſo ſeldom obtained; where Reaſon, and Philoſophy, eaſily ſubdue any remaining Paſſions, and which cloſeth at length the laſt Period, like the Evening of a Summer's Day. Lord *Bacon* * has juſtly obſerved, that the ſame Regimen, and Conſtitution, which produces the greateſt Health, and Vigour, is not moſt likely to promote long Life; and *Hippocrates* †, though unacquainted with the Circulation of the Blood, and the neceſſary Conſequences of it, and who endeavoured to explain different Temperaments, from the different Nature, and Union of Fire, and Water, which actuated them; yet, with his uſual Sagacity, mentions Perſons of this Conſtitution, as liable to frequent Diſorders in the former Part of their Life, and acquiring a healthy State, as they advance in Age; and adds, that by a *temperate Regimen*, very *moderate Exerciſe*, and *Abſtinence from all Labours which waſte, and heat*, they generally live to an healthy, and extreme old Age.

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* *De Vitâ et Morte.*

† *De Vict. Ratione, Sect.* IV.

Hence likewiſe ſuch a general Regimen of Diet may be eaſily deduced, as is moſt ſuitable to theſe different Stages of Life, and which *Hippocrates**, with his uſual Brevity, judiciouſly points out; for the Heat, and Velocity of the Blood being greater in young Animals, with Reſpect to the Weight of the Body, than in thoſe more advanced in Years; larger, and more frequent Supplies of light Nouriſhment are neceſſary, not only to repair the Waſtes, but to give Materials for increaſing the Bulk of their Bodies: Whereas in the declining, laſt Stage, where the Circulation becomes more languid, the Veſſels more rigid, and contracted, and conſequently, the Waſtes but ſmall; the Nouriſhment muſt be light, and warm, but gradually leſſened in Quantity.

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* *Sect.* I. *Aph.* 14.

THE laſt conſtituent, ſolid *Stamina* of a human Body, are mere *Earth*; for they are not diſſolvable in *Water*, *Fire*, *Oil*, *Spirit*, or *Air*: Neither is the ſtrongeſt Force of Fire, though ever ſo long continued, ſufficient to deſtroy the Form of an *Hair*; but theſe pure, elementary Parts, by repeated Attritions, and Comminutions, are ſo attenuated, that they conſtitute Part of the fineſt Fluids, which enter into the moſt minute Veſſels of the Body; otherwiſe they could not nouriſh, if their Parts were not leſs than the moſt minute Canal, which is to be repaired; but all the large Veſſels are formed of theſe ſmall Veſſels, and conſiſt of ſuch Materials as at firſt nouriſhed them, and increaſed their Bulk; but by a *chymical Analyſis*, reſolved, and ſeparated, they yield nothing *ſolid*, but *Earth*; therefore that which compoſed them, was only Earth. Thus *Moſes* pronounced, that great Oracle of Truth, that *God at firſt formed Man out of Earth*; and hence in ſeveral Paſſages of the Poets, Men are called Αυτόχθώνες, *Terrigenæ*, *Terræ Filii*.

These *terreſtrial* Parts, which are the Baſis of a human Body, have not a ſufficient *Attraction*, and *Coheſion* to give them a proper *Solidity*; but receive this Advantage from the intermediate Poſition of a *glutinous* Humour, which is either aqueous, or oleaginous; but by the repeated Action of the Veſſels, as by frequent Diſtillations, is attenuated to the greateſt Degree of Fluidity. Thus Bones, that have been expoſed to the Air for the Space of twenty Years, contain half their Weight of Water, and when ready to moulder into Duſt, recover ſoon their Solidity, by pouring *Water*, or *Oil* on them; for Water mixed with ſeveral Bodies of a ſoft Nature, gives to them the greateſt Firmneſs, as it appears in that Sort of Clay of which chymical Veſſels are formed, which by being mixed with Water, hardens to ſuch a Degree, that theſe Veſſels cannot again be diſſolved by *Water*, and reſiſt the greateſt Degree of Fire, better than any other Sort.

HENCE appears the Reaſon, why the Veſſels are not diſſolved by the circulating Humours, and why ſome of the Solids, as the Bones are harder than the reſt? The Circulation being weaker in ſuch Veſſels, than in any other, the *Abraſions*, and *Repairs* are neither ſo *great*, or *frequent*; by which Means they have more Time to become *hard*: Thus Veſſels formed from Clay, are at firſt yielding, and ſoft, and grow firm by Degrees.

THE only Difference between the Solids, and the nouriſhing Parts of the Fluids, is, that the former are more at reſt, and have a ſtronger Coheſion; the latter are more eaſily ſeparated, and in perpetual Motion; for if a Thouſand ſmall Globules be ſuppoſed to move in a proper Vehicle, through a Canal compoſed of the ſame Materials, though they are then to be conſidered as a Fluid; yet if one of them ſhould be preſſed into a ſmall vacant Pore of the Canal, it ſtops there, and becomes ſolid, or a Part of it; and by being at firſt *prominent*, ſuſtains in that Point, the *whole* Force of the circulating Fluid, which was before ſuſtained by *ſeveral Points* of that Canal, (as is evident from the Doctrine of *Hydraulics*) by which Means it becomes fixed, and conſtitutes a Particle exactly like that which has been abraded.

Hence appears the Reaſon, why Scars, or Marks, proceeding from the Small-Pox, or other Cauſes, perpetually retain the ſame Form, notwithſtanding the Veſſels are ſo often abraded, and repaired? and how erroneous *Keil's* * Opinion is, who from thence imagined, that the Solids of the Body never received any Decay, or Addition, and that Nutrition conſiſted only in adding to the Fluids. But if this was true, it muſt conſequently follow, that the Fibres of a robuſt Man, ſhould be weaker, by being more *diſtended*, than the Fibres of an *Infant*;

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* *Tentamen Primum de Sanguinis Quantitate.*

and if he had ever obſerved, that the hardeſt Stone is at length made hollow by repeated Drops of Water, he could never have imagined, that the Veſſels in an human Body were ſo firm, nor that the Force of Circulation was ſo very languid; but this ingenious Perſon ſeems in ſome Meaſure to fall into this Error, that he might from thence explain the *Poſſibility* of the *Reſurrection* of the ſame Body. But cannot the Truth of this Paradox be more phyſically deduced from the former Principles? ſince it has been proved, that the *ſolid* Parts of all Animals, conſiſt of the *ſame unchangeable* Materials; and therefore not to be altered even by the laſt *Conflagration.*

NUTRITION is ſcarce the ſame in any two different Perſons; for it is varied according to the Difference of *Age, Conſtitution,* and *Manner* of Living. Hence

Hippocrates * obſerved, that Infants cannot bear Abſtinence; for the nearer the Veſſels are to their Origin, the more eaſily they yield, and are diſtended by the circulating Humours, and the greater Supplies are thence wanted to fill up the empty Spaces. *Lean* Men (*cæteris paribus*) wear faſter, and require larger Repairs than *fat* Men, their Fluids being generally more *acrid*, and agitated with a greater Degree of Velocity; and, for the ſame Reaſon, ſuch as uſe Exerciſe more than ſuch who lead an indolent Life, who are generally on that Account remarkable for having a weak Appetite.

NUTRITION is not equally performed in any two Parts of the Body, the Force of Circulation being different in every Point between the Heart, and the laſt Extremities of the Veſſels. Through every Part of the Body, there is a peculiar Circulation, and but a very ſmall Quantity of the Blood, which is expelled from the Heart, circulates through the whole Body. The quickeſt Circulation is in the *coronary* Arteries, diſtributed through the Subſtance of the Heart, which, allowing ſixty Pulſes to a Minute, is finiſhed in $\frac{1}{3600}$ of an Hour. Theſe *Arteries* terminate in three different Places in the Cavity of the right Ventricle, in the Cavity of the two Auricles, and in the *coronary* Veins. The Circulation which is next performed in the ſhorteſt Space of Time, is through the *Bronchial Arteries*, which take their Origin ſometimes from the *Aorta*; and from the *firſt*, *ſecond*, and *third intercoſtal* Arteries; and it may be laid down as a *general Rule*, that *(cæteris paribus)* the nearer the *Origin* of the *Artery* is to the *left* Ventricle of the *Heart*, and its *returning Vein* to the *right* Ventricle, the quicker, and ſtronger the Circulation is through ſuch Parts; and conſequently the Abraſions, and Repairs are more frequent in ſuch Veſſels, than in any other.

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* *Lib.* I. *Aph.* 13, 14.

HENCE appears how erroneous *Lower*'s * Concluſion is, who from the given Quantity of Blood in the Body, and the Quantity paſſing through the Heart in a certain Space of Time, would from thence determine in what Space of Time the whole Maſs of Humours circulates through the Body; not conſidering that Part of the two Ounces which are ſuppoſed to be expelled from the Heart every Pulſation, is propelled into the coronary Arteries, and returns in the $\frac{1}{3600}$ of an Hour (allowing ſixty Pulſes in a Minute), and that what Part of the two Ounces paſſes to the *Extremities*, requires a long Time to return: Before he could make a juſt Computation of that Nature, he muſt have known the Diſtance of every Ramification of the *Aorta*, and of its *returning* Vein, the *Quantity* of Blood, and the Velocity with which it circulates through each Veſſel; but it ſeems impoſſible to make a juſt Calculation of that Nature.

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* *De Sanguinis Motu et Calore.*

Is not the Manner of Nutrition, and the Materials of Nouriſhment the ſame in all Animals, as in Plants? and is not the Reaſon why all cannot be nouriſhed by the ſame Food, owing to the *different Strength* of the Veſſels, and of the circulating Humours, rather than to a Difference of the Materials required? ſince from the *ſtrongeſt Animal*, to the moſt *tender Vegetable*, the Strength of the Food is always proportioned to the Strength of the Veſſels, and Nature of the circulating Humours; and that whatever is uſed for Diet, from the ſtrongeſt

Food, to Water depurated by repeated Diſtillations, by a chymical Analyſis examined, affords the ſame *terreſtrial, ſolid* Parts for Nouriſhment, though in a different Quantity.

Nothing more contributes to promote Nutrition than *Sleep*, for then the Humours are generally ſupplied with a greater Quantity of nouriſhing Parts fit to repair; and the Attritions, and Abraſions of the Solids, are neither ſo great, or frequent; for according to the Laws of Motion, the *Momentum* of the circulating Fluids decreaſes in Proportion to their Diſtance from the Heart; neither is the Force of the Heart alone ſufficient to continue a free Motion of the Humours through all the Veſſels; for in the ſmall diſtant Canals the Circulation is chiefly promoted, by the compreſſing Force of the Muſcles; but as this Motion in the Time of Sleep entirely ceaſes, and ſince no other Motion is continued, but what is received from the Heart, it muſt in the decreaſing Series of Veſſels gradually grow more languid, until at length it almoſt ceaſes in the laſt, and moſt minute Veſſels: Hence the Circulation muſt be unavoidably ſtronger in the larger Veſſels; by which means the Chyle, by more frequently paſſing through the Lungs, and receiving more repeated Alterations, and Comminutions from the Action of this Bowel, is ſooner changed into *Serum*, than if it could freely circulate through the more minute, lateral Veſſels, which could not act ſo ſtrongly on it. The *Heat* of the Body likewiſe, which at the Time of waking, is greatly varied, is now *conſtant*, and *equal*; neither is there a *Variety* of Preſſure in the Veſſels, nor a *diſproportioned Velocity* in the Humours; but theſe are as fit to enter, as the others to receive them. Hence the Serum, through the various progreſſive Series of

Veſſels is gradually reſolved into more fluid Parts; and the Veſſels that were before abraded, are now gently repleniſhed, and recruited.

Any Part of the human Body quickly languiſhes, and decays, if either the Arteries, or Nerves, which are deſtined to it, are deſtroyed: Therefore it is not only neceſſary that theſe Veſſels ſhould be ſupplied with well-prepared Materials of Nouriſhment; but that a due Quantity of *animal Spirits*, ſhould be likewiſe conveyed to them in a regular Motion; however this Inaptitude for Nouriſhment, which ſucceeds the Deſtruction of a Nerve, does not prove that animal Spirits can repair, or increaſe the ſolid, muſcular Parts of the Body, though a free Influx of them into ſuch Parts as are to be nouriſhed, is abſolutely neceſſary; for the Circulation, and conſequently Nutrition, not only depend on the Force of the Heart, but on the *vibrating Motion of the Veſſels,* which is entirely owing to the Nerves; with which the various Ramifications of the *Aorta* being encircled, and largely ſupplied, receive from thence that *ſenſible Energy*, which enables them to give a Motion, and Appoſition to the Materials of Nouriſhment, which the Veſſels, otherwiſe inactive, would only contain.

SECT. II.

Of Animal Spirits, and Nervous Diſeaſes.

SOME eminent Writers on the animal Oeconomy, have denied the Exiſtence of animal Spirits; and endeavoured to explain the Action of the Nerves, in a more mechanic Way, as ariſing from infinitely quick, and regular Vibrations, from their own Elaſticity, or from the Action of a ſubtile Æther on them; while others, who acknowledge the Nerves pervious to a Fluid, have, by Experiments, by no means, concluſive, aſcribed Qualities to it, very different from its real Properties. I ſhall therefore make a few Obſervations on the Nature of this nervous Fluid, or *animal Spirits*; which are formed for more extenſive Uſes, than Senſation, and muſcular Mo-

Motion; and without whoſe Influence, as a Fluid, the principal *Digeſtions* muſt be very deficient, and the Body ſoon languiſh, and decay.

Whoever conſiders the Structure of the Brain, which is one of the largeſt Bowels of the Body, and receiving by the Computation of *Malpigius*, one third, but by a more accurate Examination of *Haller*, one ſixth Part of all the Blood; and that the pureſt, and moſt active, and that the *carotid*, and *vertebral* Arteries, which form the whole Brain, gradually decreaſe in ſuch a Manner*, before they terminate in the medullary Part, that a Hundred of them, when injected, are not together equal to an Hair, may ſafely conclude, that from the laſt Series of them, there muſt be an elaborate Secretion of ſome fine, active Fluid. This is agreeable to that *Analogy*, which is obſervable in all the other Bowels, where there is neither ſuch an elegant *Appaıatus*, or curious Mechaniſm. But whoever juſtly reflects on this, will much leſs expect to make this *nervous Fluid* the Object of Sight, than Air; though from the Effects of an artificial *Ligature* applied to the Nerves, and of paralytic Diſeaſes, the Exiſtence of it is as evident, as of that of the Air, from the known Experiments in the Air-Pump.

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* *Ruyſch, Ep.* 9. *Th.* 10.

BORELLUS, and *Malpigius*, convinced of the Exiſtence of a nervous Fluid, imagined it to be eaſily viſible, and of a glutinous Nature, coagulating by Fire: They ſeem to be led into this Error, from ſome groſs Experiments, which were made on a Nerve cut tranſverſely, and placed in an Air-Pump, from whence ſuch a glutinous Humour diſtilled; but which then evidently flowed from the wounded lymphatic Veſſels, with which the Coats of the Nerves are plentifully ſupplied; and not from the Cavity of the Nerves, which is infinitely ſmaller than that of the lymphatic Veſſels: And *Bartholomæus Euſtachius*, and after him *Ruyſch*, and *Leuwenhoeck*, obſerving ſeveral Pores in a dried Nerve, cut tranſverſly, with as little Reaſon concluded them to be the Cavities of the Nerves; and were confirmed in this Opinion by an Experiment which really refuted it; for, by injecting a black Liquor into the *carotid Artery*; and afterwards cutting tranſverſly the *optic* Nerve, they obſerved this Liquor to be diſperſed through its Subſtance, which evidently proceeded from a Repletion of ſeveral minute Veſſels, which are freely interſperſed through every *Faſciculus*, or Collection of Nerves, and whoſe Cavity is probably a thouſand Times leſs than that of the injected Veſſels.

THAT animal Senſation, or muſcular Motion, is not owing to *elaſtic Vibrations* of ſolid Strings, or to the Activity of a *ſubtle Æther* exerting them, is evident from the Texture, and Nature of the Veſſels of the Brain; for the *carotid,* and *vertebral* Arteries, at their firſt Entrance into the *Cranium,* lay aſide their external, *muſcular* Coats; and by that Means, even in their firſt Origin, become much leſs *elaſtic,* than they were before: Therefore the Nerves, which are derived from the laſt Series of theſe Arteries, muſt certainly become more fit for an *equal, ſlow* Expanſion, and Contraction, than for *quick* Vibrations; and are ſo exquiſitely *ſoft,* and *tender* within the Brain, that in their Paſſage from thence, they are ſafely directed through riſing Ridges, formed like ſo many Grooves, in the Baſis of the Skull, which guard them from any Preſſure on them; and when they arrive to the *Dura,* and *Pia Mater,* they do not pierce them, but are involved in theſe Coats, which are thence protruded with them, and become a neceſſary Defence in their farther Progreſs; but whenever they arrive to any Part, where they exert their Functions of *animal Senſation*, or *muſcular Motion*, they lay aſide theſe *defending Membranes*, (which have likewiſe their peculiar Uſe) and become *expanded*, and as *ſoft*, and exquiſitely *ſenſible* as they were within the Brain. Thus the *Coats* of the Eye, are formed from the *Membranes* of the *optic Nerve*, which is expanded into a fine *Net-Work*, not improperly called the *Retina*; and thus the whole *Cutis* ſeems to be only an Expanſion of the *Dura*, and *Pia Mater*, under which the Nerves lie as naked, and tender, as within the Brain; and form what *Malpigius* juſtly terms a *Plexus Reticularis*.

It is therefore evident, from the *Structure* of the Nerves, and from their being de-

deprived of their Influence, when obſtructed by a *Ligature,* or *Diſeaſes,* that the Exerciſe of their Functions depends on the Motion of a *nervous Fluid,* or *animal Spirits* through them; and that they are moſt unfit for *elaſtic Vibrations*; but though a *diſtended,* elaſtic Chord, may be ſuppoſed capable of ſuch Vibrations, how can they be expected in *irregular, recurrent,* and really *relaxed* Strings? How can the *Nerves,* which are diſperſed through the Bladder, convey the Senſation of ſo much Pain from a Stone lodged there, when the Bladder is in an empty, and *relaxed* State, and they then ſo *flaccid,* and *unbraced* as to be in every Reſpect moſt incapable of *elaſtic Vibrations.*

This nervous Fluid ſeems to be formed for more *extenſive Uſes* than *Senſation,* and *muſcular Motion*; and ſuch as never could be anſwered by *ſolid, elaſtic* Strings; for it is more than probable, that after it has performed theſe principal Functions, it is abſorbed by the lymphatic Veſſels, and returns into the Blood, whoſe Energy, and Fluidity is much aſſiſted by it. What a great Supply of animal Spirits are probably given to the meſenteric Glands, from the ſeveral Collections, and Diſtribution of Nerves, which cannot there be expended on *Senſation*, or *muſcular* Motion, and ſeem principally deſigned to animate the Chyle, which is the moſt *crude* Humour in the Body, with the moſt perfect, and *active Fluid*; and returning with it into the Blood, performs like the other Fluids of the Body, a *regular Circulation*. This Structure of the Nerves, which, at the ſame Time that it anſwers the principal Ends of *Senſation*, and *muſcular* Motion, contributes to promote the principal Digeſtions, and to animate all the Fluids, is agreeable to that uniform, and extenſive Wiſdom, which is obſervable in the whole animal

Oeconomy. Thus the Semen, by a ſurpriſing Mechaniſm, is ſeparated, and collected, not only for the Propagation of the Species, but for the Benefit of the Individual, to which the Beard, and the maſculine Voice, and Vigour, are in a great Meaſure owning.

From hence it appears, that there are two principal Circulations in the Body, the one proceeding from the *Heart,* and thence carried through the whole arterial Syſtem, whoſe Veſſels are *conic,* and *elaſtic*; the other which likewiſe depends on the Heart, but more immediately on the *Brain, through the Nerves,* which are *fine, ſenſible, extended, cylindric* Tubes, derived from the laſt Series of the united, *carotid,* and vertebral Arteries, containing the moſt *ſubtile,* and *active* Fluid in the Body, thus prepared by this curious Mechaniſm, and probably, by the Interpoſition of Glands, agreeable to that

Analogy, which is obſervable in all the other Bowels. Theſe Nerves are diſtributed to every Part of the Body, for *animal,* and *vital* Functions, as the fineſt Veſſels of the arterial Syſtem are for *Nutrition*; and though only forty Pair are ſuppoſed to proceed from the *Brain,* and *ſpinal Marrow,* they may more juſtly be eſtimated to be ſo many Hundred, as every *Faſciculus* contains a great Number of diſtinct Nerves.

From the *Texture* of the Nerves, and their Diſtance from the Heart, the Motion which this Fluid thence receives, muſt neceſſarily be *ſlow, uniform,* and *conſtant*; yet it is likewiſe evident, that theſe Nerves, with the Fluid contained in them, are endued with Properties peculiar to them, and are the *principal Inſtruments* on which the *Mind,* by its Action on them, is capable of *determining* a greater *Quantity* of this nervous Fluid to particular Parts, and of greatly *increaſing* its *Velocity*; on which Account, muſcular Motion is as quick as Thought.

THIS *Union* of the *Soul* with the Body is evident; and though in their *diſtinct Natures* they are very *different*, yet their *Connection* is ſuch, that they are *mutually* affected, and give, and receive Impreſſions from each other: But this is not to be explained from mechanic, or any other Principles; and only known by the great Author of Life, and Motion: It is ſufficient for all the Intentions of Philoſophy, and Phyſic, to obſerve the Effects produced by their mutual Union, and Action on each other.

HENCE we may eaſily apprehend, why nervous Diſeaſes are generally ſo obſtinate, and require a long, and careful Regimen to remove them? For where the Digeſtions are *impaired*, and the Blood not well *prepared*, or *vitiated*, the *nervous Fluid* ſeparated from it, muſt unavoidably be affected, and deviate from a healthy State.

Is not *Sleep* abſolutely neceſſary for a due *Collection*, and *Separation* of animal Spirits? When they are *waſted*, by having exerciſed their Functions for a certain Space of Time, and the Nerves are thence *collapſed*, will not Sleep, and a *Repletion* of them, be the natural Conſequence in healthy, undiſturbed Bodies? Do not the Repairs of the Body, and a new Supply of ſuch Spirits, equally depend on the laſt Digeſtion being regularly, and completely finiſhed?

HENCE the different Nature, and Manner of Operation of *nervous Medicines*, may be explained, why ſuch which ſtrengthen relaxed Conſtitutions, or correct any Errors in the Digeſtions, can only juſtly de-

deſerve that Name? and why *volatile*, and *ſtimulating* Medicines may give a more immediate, but leſs laſting Supply of Spirits?

HENCE appears the Difference between *natural* Spirits, which flow freely, and regularly from a full Fountain, ſupplied by *Sleep*, and good *Digeſtions*, and *artificial* Spirits, produced by *irritating* Medicines, or by the violent *Action* of the *Mind* on the *Nerves*; the former are like the rich Juice, which ſpontaneouſly flows from the natural Preſſure of ripe Grapes on each other; theſe more like the laſt-forced Preſſings, which ſoon degenerate into Vinegar.

HENCE may be explained the Nature of ſuch nervous Diſorders, which are originally owing to an *irregular*, or *continued* Action of the Nerves on the *Mind*, or of the Mind on the *Nerves*; why theſe, who have the quickeſt Senſations, and the greateſt Flow of Spirits, are often moſt liable to Intervals of the greateſt Dejection, and Lowneſs? and why Temperance, and more moderate Pleaſures, will give them a more equal, and conſtant Supply? and why *ſudden*, and *ſtrong*, or *continued* Impreſſions on the Mind, will be apt to bring on a *particular* Species of *Mania*, or *Melancholy?* Nervous Medicines may moderate the Effects, but will not remove the Cauſe of theſe Diſorders. In theſe Caſes, and particularly in the latter, Reaſon, and Philoſophy, and varying the Objects of the Mind, and gradually ſubſtituting others more agreeable in their Place, are the *Medicina Mentis* chiefly to be depended on. On this Account, conſtant Exerciſe, eſpecially travelling to new Places, will be always found moſt effectual; for, during the *Motion* of the Body, it is difficult to *fix* the *Attention* of the Mind to any particular Ideas, when it is *quick* almoſt impoſſible; at the ſame Time a perpetual Succeſſion of new, external Objects, will inſenſibly make an Impreſſion, while the Mind is leſs capable of reflecting on its own diſagreeable Ideas. I willingly omit dwelling on the Advantages which muſt attend Exerciſe, as it improves the Strength of the Body, and Digeſtions; and only conſider its Influence on the Mind: The *Velox Mente nova,* which *Horace,* with a peculiar Happineſs of Expreſſion, gives to Wine the Power of *creating*, may, I think, be juſtly here applied to conſtant Motion, and Exerciſe; and when prudently blended together, their Efficacy will be more certain, and agreeable.

CHAP. VI.

Of Perſpiration, and the Diſeaſes of the Third Digeſtion, and Diſcharge.

THUS by the *third*, and *laſt* Digeſtion, the Aliment is at length reduced into ſuch fine animal Fluids, as are fit to circulate through the moſt minute Veſſels, to repair them, and to furniſh proper Materials for the finer Secretions; while the *ſuperfluous Parts* of it, and ſuch as are too much attenuated, to be ſafely retained within the Body, are diſcharged by *inſenſible Perſpiration*, from the Extremities of the exhaling Arteries, ſpread over the whole Surface of the Body: This is the *third* great *Excretion* from the *laſt Digeſtion.*

HENCE it appears, that to preſerve a human Body in an healthy State, it is neceſſary that the *Quantity,* and *Quality,* of what is reſtored to the Solids, and Fluids, ſhould be exactly proportioned to the Strength of the Conſtitution, and the Diſcharges. If the *Quantity* is increaſed, though changed into good digeſted Humours, the Body becomes *plethoric*; if leſſened, an *Atrophy* ſucceeds; if the *Quality* of them is vitiated, it becomes *cachectic.* This equal, and juſt Reſtoration of the Solids, and Fluids, conſtitutes *Nutrition,* which as widely differs from *Repletion,* as Water poured on the Root of a Tree, from the laſt digeſted Juices, from whence the Fruit is produced.

THOUGH theſe Arteries perpetually draw off from the Blood a certain Quantity of this exhaling Fluid; yet that Diſcharge of it, which ſucceeds when the ſecond Digeſtion is *finiſhed*, and the third proceeds regularly, is much greater than at other Times; eſpecially when aſſiſted by Exerciſe, or Sleep, and leaves the Body more light, and active. When the laſt Digeſtion is *weak*, and *imperfect*, the Diſcharge, by Perſpiration will be more *crude*, and generally in a leſs Quantity; neither if ſufficiently increaſed, will it be ſucceeded with that Freedom of Spirits, and Activity of Body, which attends good Digeſtions, and a *concocted Perſpiration*: But the ſudden Diminution of this *concocted Perſpiration*, as being more active, and acrid, is attended with more immediate, and ſenſible Effects, than of *crude* Perſpiration; the one is apt to produce *painful*, and *inflammatory* Diſeaſes, the other more *ſlow*, and *languid* Oppreſſions;

the former is generally more quickly ſucceeded by an increaſed, *ſenſible* Perſpiration; the latter by an increaſed Quantity of *Urine.*

There is ſuch a particular Connection between the *Renal* Glands, and theſe *exhaling Arteries,* that in temperate, healthy Bodies, according to the different Changes of the Air, and Seaſons of the Year, the Quantity of Urine generally increaſes, in the ſame Proportion, in which the Quantity of Perſpiration diminiſhes; and there is likewiſe a remarkable Analogy between the *excreted* Matter of the *ſecond,* and of the *third* Digeſtion, between *Urine,* and *Perſpiration;* for when the ſecond Digeſtion is weak, and imperfect, the Urine is *crude,* and *turbid,* and muſt always be attended with a languid Circulation, and a Diſpoſition to form Obſtructions in the Veſſels more peculiar to that Digeſtion; which is equally the Caſe in a *diminiſhed*, and *crude* Perſpiration; but as the Veſſels of the laſt Digeſtion, are finer, they are more immediately, and ſenſibly affected by an *oppreſſing* Load, or *irritating* Acrimony: And as the Urine ſeparated from the Serum, after long faſting, and Exerciſe, is highly *acrid*, and in a ſmall Quantity; ſo likewiſe that Perſpiration, which in the ſame Circumſtances, is diſcharged from the Fluids, muſt be more acrid, and leſs in Quantity, than *concocted Perſpiration*, and when retained, be particularly apt to affect the *Head*, and the *nervous Syſtem*: Hence that remarkable Relief, which is obſervable in beginning feveriſh Diſorders, and dry Heats, from a *ſenſible* Perſpiration; for when the retained perſpirable Matter has acquired any great Degree of Heat, and Acrimony, it will be always more apt to paſs of by *Sweats*, as that of the more *crude* Kind will by *Urine*, unleſs a ſenſible

Perſpiration is ſoon promoted by Heat, or Exerciſe.

ALL the *internal Cavities* in the Body, are in the ſame Manner as the *Surface* of it, ſupplied with theſe *perſpiring Arteries*; but the Fluid *exhaling* from them, does not leſſen its *Weight*, but is received into the *abſorbent Veins*; and by its Activity, contributes to animate, and dilute the venous Blood, which has been deprived of its finer Parts, by previous Secretions; and whenever Perſpiration is checked by external Cauſes, this internal Perſpiration muſt of courſe be greatly increaſed. Hence probably are ſupplied theſe Materials for that plentiful Diſcharge by Urine, which uſually ſucceeds a ſudden, diminiſhed Perſpiration on the Skin, as the *abſorbent* Veins quickly then receive a greater Quantity of that Fluid.

IT is more than probable, that the *abſorbent* Veins, are equally numerous with the *perſpiring* Arteries, both in the *internal* Cavities, and on the *external* Surface of the Body; that theſe imbibe Moiſture from the Air, and warm Bathing, is evident from ſeveral Experiments; ſo that inſenſible Perſpiration may be often greater in ſome *Conſtitutions*, and ſome *Climates*, than can be eſtimated from the ſenſible Diſcharges, and the Quantity of Food: Hence probably depends that Difference, which is obſervable between *Perſpiration*, and the *other Diſcharges* in the Static Experiments of *Sanctorius* in *Italy*; and of others in more *moiſt Climates*, who undoubtedly made their Experiments with the ſame Accuracy. Theſe abſorbent Veſſels have always a greater Aptitude to draw in Moiſture, when the whole Syſtem of Veſſels is moſt empty; and ſeveral Inſtances have been known, where large Extravaſations have been abſorbed, eſpecially when previous Evacuations have been uſed.

The Quantity of Perſpiration from the internal Cavities, which are never expoſed to the cold Air, muſt be very conſiderable, as the Quantity which perſpires from the internal Surface of the Lungs, and contributes to reduce the Weight of the Body, has been eſtimated by *Sanctorius* * to be one-tenth Part of the whole Perſpiration; but the ingenious Dr. *Hales* † ſays, that from certain Experiments, he has found it to be much more conſiderable.

Hence may be explained, why a *Diarrhœa,* in ſome Conſtitutions, often ſucceeds a ſuppreſſed, external Perſpiration; while in others, ſevere *Colic* Pains, and *Inflammations* of the *internal* Membranes, are the Conſequences of it? the retained Humours, being more crude, and in a greater Quantity in the former;

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[*] *Sanct. Sect.* I. [†] *Vegetable Stat. Vol.* I. P. 10.

and more acrid, and in a leſs Quantity in the latter: Why *aſthmatic* Perſons, are ſometimes in a few Minutes oppreſſed with a great Difficulty of Breathing, from a *local* Diminution of Perſpiration, in the Veſſels of the Lungs, which are thence eaſily oppreſſed, and irritated into *ſpaſmodic* Contractions; and why they are immediately relieved by a Change of Air, or by inhaling Vapours of a contrary Nature?

Hence it is evident, that to preſerve an equal Degree of Health, the Supplies of Food ſhould not only be equal to all the Diſcharges; but that theſe ſhould likewiſe bear a due Proportion to each other, and that the *Static Medicine* affords the beſt, and moſt certain Rules for preſerving Health, and curing Diſeaſes, eſpecially of the chronic Kind. *Hippocrates* * very juſtly obſerves the Neceſſity, and Difficulty of adapting a Regimen of Diet ſuitable to different Conſtitutions, and the various Seaſons of the Year; and though he thinks that this Knowledge may be acquired by a Phyſician, yet he adds, that to preſerve a *conſtant* State of Health, it is likewiſe neceſſary that the *Quantity* of Food, and Exerciſe, ſhould be *exactly* known; and which ought neither *to exceed, or fall ſhort of a certain Meaſure.* Is not this the Static Doctrine expreſſed in the plaineſt, and ſtrongeſt Terms? But at the ſame Time that, with a ſurpriſing Sagacity, he ſaw the Uſefulneſs of ſuch a Knowledge, he ſeems to lament that it was impoſſible ever to attain it.

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* *De Victus Ratione, Lib.* I. *Sect.* II.

The Glory of this Invention, is owing to *Sanctorius,* an *Italian* Phyſician, who from a Courſe of Experiments, continued above thirty Years, has evidently proved, that once in a natural Day, the

Body of a temperate Perſon, taking a certain Quantity of Food, will return to its uſual Weight: Therefore the Sum of the Diſcharges being then equal to the Supplies, inſenſible Perſpiration will be the Difference between the Quantity of Food, and the ſenſible Diſcharges; which in the warm, dry Air of *Italy*, he found to be five-eighths of the whole, and to exceed in that Proportion the ſenſible Diſcharges. He has, with great Labour, and Judgment, ſhewn how this important Evacuation is increaſed, or diminiſhed by the various Changes of the Air, and Seaſons of the Year, by Diet, Exerciſe, and the Paſſions of the Mind. It is to be lamented, that he was unacquainted with the Circulation of the Blood, which would have enabled one of his fine Genius, and Induſtry, to have improved that Work with more practical Rules, and Obſervations. But this Defect has been in a great Meaſure ſupplied by Dr. *Robinſon* [*], who has ſhewn a peculiar Accuracy, in making his Static Experiments; and no leſs Judgment in deducing uſeful, and practical Obſervations from them.

THE *laſt* Digeſtion, and Excretion, are not only liable to the Defects, and Irregularities *peculiar* to them; but to thoſe of the *former* Digeſtions, and Excretions: On which Account, ſeveral Diſorders, particularly theſe of the *cutaneous* Kind, will ariſe from a Defect of the *ſecond Excretion*; for the more groſs, active, ſaline, and oily Parts, which are not diſcharged by their proper Channel, become eaſily diſpoſed to obſtruct the *perſpirable* Veſſels, and particularly the *Miliary*, and other *cutaneous* Glands: Theſe are diſperſed over the whole Body, but are more numerous, and collected, whereever that light, unctuous Humour ſeparated from them, is neceſſary to defend ſuch Parts from the Injuries of Attrition, or of the Air; on which Account, the *Face* is more remarkably liable to ſuch Obſtructions.

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[*] *Diſſertation on the Food, and Diſcharges.*

THESE Eruptions, have various Appearances, according to the Nature of the retained Humours, and the State of the Veſſels, and Glands: Hence ſlow, and more languid, cutaneous Obſtructions, ariſe from a crude Indigeſtion, and imperfect Excretion; while the more active Salts, and Oils, not diſcharged by Perſpiration, or by Urine, will produce more acrid, and eroding Eruptions.

HENCE it appears, that ſeveral *ſcorbutic* Appearances may be unattended with any particular, prevailing *Acrimony* in the *general* Maſs of Fluids, which cannot be effectually cured until the Diſcharges are *regulated*; and that likewiſe Medicines, which only correct the Nature of the

Fluids, can afford but a temporary Relief, (excepting in ſuch Caſes, which proceed from an improper Diet) and that none deſerve the Name of *Alteratives*, but which give a *permanent*, and regular Strength to the *ſolid* Parts.

An Error, or Defect in any of the former Digeſtions, or Excretions, may be corrected, or thrown on the ſucceeding; but any ſuch in this laſt Digeſtion, muſt unavoidably affect ſome of the Veſſels peculiar to it: Hence ariſes the great Difficulty of curing Diſeaſes of the laſt Digeſtion, as the former generally require to be firſt ſtrengthened, and regulated, and as it is difficult to convey the Efficacy of Medicines into theſe diſtant Veſſels.

As this laſt Digeſtion is of more Conſequence than the former, to which they are chiefly ſubſervient; any Error in this, or its Excretion, will more ſenſibly affect human Bodies, and this is confirmed by Static Experiments.

Hence it ſeems evident, that the Diminution, and Retention of the perſpiring Matter, will always affect human Bodies (*cæteris paribus*) in Proportion to its *Quantity*, and *Quality*, and that ſeveral *acute*, and *chronic* Diſorders, will ariſe from a *ſudden Suppreſſion*, or a *ſlow Diminution* of this Diſcharge.

SECT. I.

Of the Gout.

IS not the Gout a Diſeaſe peculiarly ariſing from a *Defect* in this *laſt Digeſtion*, and *Excretion?* and will not a gradual Accumulation of the *indigeſted*, retained Materials, be at length naturally determined on the *Joints*, where the minute Veſſels, and Nerves are moſt *compreſſed*, and where the *Reſiſtance* to the Motion of the Fluids through them is *greateſt*.

Though the two former Digeſtions, and Excretions are regular, and the laſt are *only deficient*, the indigeſted, acrid, retained Materials, which cannot paſs freely through the Extremities of the minute Arteries, peculiar to this Digeſtion, will at length be moſt apt to produce

Obſtructions in them where they are moſt *compreſſed*, and at the greateſt *Diſtance* from the Influence of the Heart; the Seat of which will be therefore in the laſt decreaſing Series of Veſſels, derived from the *Aorta*, and form the moſt *ſubtle, active, humoural* Gout.

WHEN the third Digeſtion, and Excretion are not only deficient, but receive likewiſe an Increaſe of more groſs Humours from an Error, or Defect in the *former*, the accumulated Materials will be greater, and not only affect the minuteſt Veſſels, but thoſe of a *larger* Series, and form a more *complicated Species* of an *humoural Gout.*

THOUGH all the other Digeſtions, and Excretions are regular, yet if that of the *nervous Fluid* is *vitiated*, will it not produce a *principal Species* of the Gout? and though this may ſingly exiſt, yet is it not very probable, that it will always neceſſarily attend every other Species of the Gout?

The laſt Digeſtion would be very imperfect, if from thence only were prepared proper Materials for repairing the Decays of the Body; for unleſs a new Collection, and Supply of the *nervous Fluid,* was likewiſe regularly formed, all the finer Secretions, and animal, and vital Functions muſt languiſh, the Humours would become *effete,* and *vapid,* and even *Nutrition,* without this *animating Fluid,* would be deficient. It has been already obſerved, that this nervous Fluid is prepared in the laſt decreaſing Series of the carotid, and vertebral Arteries; which, by a ſurpriſing, and intricate Mechaniſm, form the Brain, and that it is chiefly collected in the Time of *Sleep*; but though the Manner is in ſome Reſpects inexplicable, yet its *Exiſtence,* and *Energy* are evident, and a due Preparation, and Collection of it, may be juſtly conſidered as the moſt *perfect Operation* of the *third Digeſtion*. It is likewiſe evident, that the Extremities of theſe Nerves, wherever they terminate, ſeparate this active Fluid for various Uſes; and that the remaining Part of it is received into the abſorbent, lymphatic Veins; and by performing a *regular Circulation*, animates the returning Humours, and probably ſupplies Materials for the more eaſy *Preparation*, and *Recollection* of it.

HENCE may be explained, the different Nature, Symptoms, and Progreſs of a *nervous*, and *humoural* Gout, as they ſingly exiſt, or as they are generally combined.

THIS nervous Fluid may be vitiated by a certain Degree of *Viſcidity*, or *Acri-*

mony. This ſeems to be confirmed by the Diſeaſes peculiar to it; and by that *Analogy,* which is chiefly obſervable between the other Humours of the Body, when they deviate from a healthy State; and it is very probable, that whatever is the prevailing, indigeſted Nature of the Humours, will affect in the ſame Manner the nervous Fluid.

THE Nature of the Gout appears to be ſo very ſubtle, that the * moſt eminent Writers on that Subject, have conſidered it as ſingly owing to a vitiated State of the *nervous Fluid*; but though this may be juſtly aſſigned as a *principal* Cauſe, yet a *Defect,* and an *Irregularity* in the other *Digeſtions,* and *Excretions,* ſeem likewiſe neceſſary to produce different Species of an *humoural* Gout; and without which, the Symptoms peculiar to each, can neither be explained, nor a rational Regimen directed, to prevent, or moderate the Progreſs of that Diſeaſe. *Hippocrates* * ſeems to point out this complicated Gout, and obſerves, that it will become more *obſtinate*, and *difficult* when it is ſituated in the *fine Veſſels*, and *Nerves*, and has often engaged theſe Parts.

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* *Boerhaave Aphoriſm. de cognoſcendis et curandis Morbis Mead Monita Medica.*

OBSTRUCTIONS formed in the Extremities of the Nerves, muſt be attended with the moſt acute Pain; and by the Spaſms always attending them, will likewiſe unavoidably produce *Obſtructions* in the fineſt Veſſels derived from the *arterial* Syſtem, with which they are intimately connected; by which means they ſoon will in ſome Degree, mutually affect each other, and produce the moſt *ſubtle*, *active*, and *cauſtic* Species of the Gout.

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* *De Morb. Vulg. Sect.* IV.

HENCE appears the Reaſon, why too cloſe an Attention of the Mind, eſpecially when attended with a Want of *Sleep*, will not only be the immediate Cauſe of a *nervous* Gout in Perſons pre-diſpoſed to it; but likewiſe ſeldom fails of bringing on a Paroxyſm of an *humoural* Gout, which was before accumulated, but inactive in the Extremities of the Arteries? and why in ſome Conſtitutions, where the Digeſtions are crude, and imperfect, the Paroxyſms are more languid, and leſs effectual; not eaſily fixed, and when fixed, more tedious; while in others in whom the ſaline, and oily Parts are more attenuated, and exalted, they are more painful, but ſhorter?

HENCE likewiſe appears the Reaſon, why Perſons of a ſtrong, bilious Conſtitution, in whom the *Appetite*, and *two former* Digeſtions are often remarkably good, are ſubject to the moſt ſevere Paroxyſms of the Gout; eſpecially if they feed on an high Aliment, and freely uſe Spirituous Liquors? and why ſuch, when the *ſecond Excretion* is particularly *deficient*, are generally attended with *ſcorbutic* Appearances, which are a *partial*, and more eaſy *Criſis* of ſuch indigeſted Humours? and why on their Diſappearance, the Paroxiſms of the Gout, become more frequent, and violent.

A *Topic Inflammation*, excited by the Quantity, or the Quality of the Humours accumulated in the Veſſels of the Joints, when juſtly proportioned to the Nature of them, is the uſeful Inſtrument by which they are ſo attenuated as to be fit either to *perſpire*, or to *paſs* into the returning Veins; when that is deficient, cold *gummy* Tumours will remain, which will gradually increaſe from new Materials added to them; and by being agitated with returning Pains, and greater Degrees of

Heat, which diſſipates the finer Parts, they at length degenerate into *chalky Concretions*, and frequently into *Abſceſſes*, and *Ulcers* of that Kind.

A *regular* Paroxyſm of the Gout, is likewiſe attended with a more general *Fever*, preceded with a Laſſitude, and light Shiverings, which not only accelerates the Progreſs of the *topic* Inflammation, but *determines* more gouty Materials circulating in the Veſſels, to the Part where the Pain is moſt ſevere, and at the ſame Time *attenuates* others, and promotes a more free *Perſpiration* of them.

HENCE it appears, that a *regular* Paroxyſm of the Gout, is the moſt *effectual* Remedy to diſengage not only the Parts *obſtructed*, but to *depurate* the vitiated Humours in the fineſt Veſſels of the *arterial*, and *nervous* Syſtem, to which the painful, though neceſſary Irritation greatly ly contributes: On which Account, the Head, and all the Faculties of the Mind, become more remarkably free, after ſuch a Paroxyſm.

HENCE may be explained the Difference between a *regular,* and an *irregular* Paroxyſm of the Gout; the former proceeding from a *gradual Collection* of ſuch Materials, and attended with an univerſal Effort to free the Parts affected, and to depurate the Humours; the latter ſuddenly excited by Force, or Accident, where there is only a *local,* or *crude* Obſtruction.

HENCE may be explained the Nature and Progreſs of a *latent*, *fluctuating*, and of an *internal*, *fixed* Gout.

UNTIL the indigeſted Materials of the Gout, are ſufficiently accumulated in the minute Veſſels of the Joints, or determined to them, no Paroxyſm can be formed; in the mean Time, they will be apt to produce *light Obſtructions*, in the *external* Veſſels on the Surface of the Body, which will gradually *perſpire*, or be *reſolved*, and received into the returning Veins. The *internal* Syſtem of Veſſels peculiar to this Digeſtion, are liable to be affected in the ſame Manner with the *external*; but from their Situation, and more equal Warmth, ſuch Humours will more eaſily perſpire into the *internal Cavities*, from whence received into the *abſorbent* Veſſels, they may in the returning Courſe of Circulation, be ſo ſubtiliſed as to paſs off by external Perſpiration, or acquire a greater Degree of Acrimony. Thus the indigeſted, acrid Materials of the Gout, when retained, and not determined to the Joints, may, in the Courſe of Circulation, be often diſpoſed lightly to obſtruct not only the *external*, but the *internal*

Syſtem of Veſſels; which laſt from their greater Senſibility, will always be more affected by them: Hence the Laſſitude, Flatulencies, Want of Reſt, ſpaſmodic, light, flying Pains, and ſuch Symptoms as uſually *precede* a Paroxyſm, may be eaſily explained; but when the Quantity of ſuch gouty Materials is large, and the Force of Circulation ſo languid, as not to determine them with ſufficient Force to the Surface of the Body, or to the Joints, they will be eaſily apt to load, and obſtruct ſome of the Membranes in the *internal* Cavities, and to produce a *fixed*, *internal* Gout.

THIS moſt frequently happens, when the Paroxyſm of a regular Gout does not return at its uſual Period of Time, or or when it is too languid, and ineffectual, or ſuddenly ſubſides by ſome Evacuation, or external Cold; for at that Time particularly, ſuch gouty Materials chiefly abound; and if Nature, which is then engaged in *depurating* the Humours, becomes deficient, and is not ſupported with a ſufficient Degree of Strength, and Motion in the Blood, they will naturally be determined to ſome of the *internal* Veſſels, *oppreſs*, and *obſtruct* them, or be gradually received into the returning Veins. This is the true Cauſe of the *Tranſition* of the Gout; for it is abſurd, and contrary to the known Laws of Circulation to ſuppoſe, that ſuch Humours, which have once formed *Obſtructions* in the Joints, could *return* back through the ſame Arteries; for ſuch muſt either remain inactive in the ſame Veſſels, from the Want of a ſufficient Preſſure on them, or gradually paſs off indigeſted into the Veins, and can only in that Manner return into the Blood; but may, in the Courſe of Circulation be ſo changed, as to be diſcharged by ſome other Excretion, or be determined again to the *Joints*, or to ſome of the *internal* Membranes.

HENCE may be explained the various Appearances of an *internal*, *fixed* Gout; which according to its Seat, Quantity, or Quality, will produce *different Species* of an *anomalous* Gout; whence that anxious Oppreſſion, and cold Senſation, which particularly diſtinguiſh a *fixed*, *languid* Gout in the *Stomach*, where the ſtrongeſt Wines, and Cordials, which are then neceſſary, ſcarce afford any ſenſible Warmth; and why a *nervous*, and more *ſubtiliſed* Gout, will affect it with ſevere, *painful* Spaſms, and require a *different* Regimen.

HENCE it appears, that a real, *internal* Gout, can ſcarce happen but when the Quantity of gouty Materials formed, is *large*, the Circulation *languid*, or the external Perſpiration is ſuddenly *ſuppreſſed*,

ſed; and why ſuch, who are naturally ſtrong, and have had but a few light Fits of the Gout, muſt greatly injure their Conſtitution by a high Regimen of Diet, and Medicine; and create new Materials perhaps for a *real* Gout, while they imprudently endeavour to produce an *imaginary*, *latent* Gout.

HENCE likewiſe it appears, how difficult, and almoſt impoſſible, it is to cure a *radicated* Gout; and how imprudent it is to confide in any boaſted ſpecific Remedy; which, though it may be accidentally uſeful in ſome Caſes, muſt be more frequently prejudicial in others.

FROM hence it is evident, that the only rational, and ſafe Method of preventing, or moderating the Paroxyſms of the Gout, is by *ſtrengthning*, and *regulating* the *Digeſtions*, and *Diſcharges*.

Is not the Static Rule, with a Regimen of Diet, adapted to it, and the Conſtitution, the moſt effectual Method of anſwering theſe Intentions?

THERE is a certain Degree of *Weight* in all Bodies, under which they enjoy the moſt perfect Health that ſuch are capable of attaining to, as their moving Powers are then in a juſt Proportion ſuperior to the Weight to be moved, and the Digeſtions, and Diſcharges more regular than at any other Time: If ſuch a Body therefore returns once in twenty-four Hours to this *Standard Weight* of Health, it will continue free from any *habitual* Diſorder, and be in the ſame Meaſure affected, as it *deviates* from it.

BEFORE a regular Fit of the Gout, the *Weight* of the Body is always increaſed, and the Diſcharge by *Perſpiration* diminiſhed; and it has been confirmed by

Experiments, that, if before the expected Paroxyſm of a regular, periodical Gout, the Body is gradually reduced, and preſerved in its uſual Weight, for the ſame Space of Time in which it uſually laſted, and Perſpiration is particularly promoted by Frictions, Exerciſe, and Diaphoretic Medicines, that ſuch a Paroxyſm will be either prevented, or rendered very moderate.

If therefore, while the digeſtive Powers were gradually ſtrengthened, and the Diſcharges regulated by proper Medicines, a Diet chiefly of the ſolid Kind, (ſuch as has been already recommended in weak Digeſtions) was uſed, and juſtly proportioned to them, it is very probable, that few indigeſted gouty Materials would be *formed*; and as by the ſame Rule, the Body is preſerved in the greateſt Degree of Health, which it is capable of attaining; if any ſuch were formed, they would with more Certainty, and Efficacy, be determined to the *Joints,* and produce a *regular* Paroxyſm.

But as an exact Regimen of Diet cannot be eaſily purſued; and as *Hippocrates* * very juſtly obſerves, is liable to worſe Conſequences from any Error committed in the Uſe of it, than of a more full Diet; it would be more prudent to obſerve a general Static Rule, by ſometimes exceeding, and at other Times reducing the Body by greater Abſtinence, and mild Evacuations, to a proper Weight, than to purſue it with a rigid Exactneſs; and this is agreeable to what Lord *Bacon* † recommends as a Means of attaining more conſtant Health, and long Life.

Every one from his own Obſervation, and particularly from an unuſual Laſſitude, and Want of Reſt, Abatement of

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* *Sect.* I. *Aph.* 5. † *De Vita et Morte.*

Appetite, and increaſing Flatulencies, may form to himſelf ſome Static Rules, uſeful, though not certain. In the general, Valetudinarians of a relaxed, nervous Conſtitution, ſuffer moſt from a Defect of inſenſible Perſpiration; eſpecially ſuch who take too great a Quantity of Liquors, in Proportion to their ſolid Food, in whom the ſenſible Diſcharges always exceed Perſpiration: Hence that remarkable Relief, which they always receive from Sunſhine, and Exerciſe: Such can only be effectually relieved by leſſening the Quantity of Liquids, and making them more generous, and by increaſing their ſolid Food, and Exerciſe.

Hence appears the Reaſon, why tho' the Digeſtions continue *impaired*, and *weak*, a *Milk Diet* will totally prevent, or greatly moderate the Return of the Gout, as it is eaſily aſſimilated, by having been already prepared in the *firſt*, and partly in the *ſecond* Digeſtion of the Animal from whence it is received; neither will it produce that Effect, unleſs it is taken in its natural Warmth, impregnated with its ſubtle, and moſt ſpirituous Parts. But ſuch a Regimen requires a very exact Conduct, and cannot without ſome Danger, and great Caution, be again changed, as new gouty Materials will be certainly formed, and as the digeſtive Powers, by ſuch a Diet, become more relaxed, and leſs capable of determining them to the Joints.

As the Appetite is often depraved, a ſolid Food cannot be taken in a ſufficient Quantity, until that is reſtored, and the digeſtive Powers ſtrengthned. The Medicines which are moſt proper to anſwer theſe Intentions, muſt be ſuited to particular Conſtitutions, and Defects in the firſt Digeſtion: The Rules neceſſary in ſuch Caſes to be obſerved, have been given in a *former Section*: Sudden Changes are not to be expected, or ſafely attempted; and the milder Stomachic Medicines, which are grateful to the Stomach, will prepare it for others more warm, and ſtrengthning.

THE Bath Waters are particularly uſeful in gouty Conſtitutions, properly prepared to drink them, ſeldom fail to improve the Appetite, and Digeſtion, to promote Perſpiration, and the finer Secretions: They likewiſe increaſe the Efficacy of other Medicines, by conveying them farther into the more diſtant Veſſels of the Body.

BATHING in theſe warm Waters, anſwers many neceſſary Intentions in this Diſtemper. Whenever there is a Plenitude, Indigeſtion, or any Quantity of gouty Materials formed in the Blood, or accumulated in the Joints, though unattended with Pain, it is improper. The *Quantity* of Water, and its *Degree* of *Heat* ought to be adapted to the Strength of the Conſtitution. The *Greek* Phyſicians directed it with great Judgment in various Diſeaſes, and condemn in others, the *unſeaſonable*, or *improper* Uſe of it. *Hippocrates* *, among ſeveral, gives an excellent, general Rule, the Neglect of which is often attended with ill Conſequences, *That when the natural Heat of the Body is ſuperior to that of the Bath, it gives Strength, and Vigour; but when inferior, a Waſting, and Langour will ſucceed.* On which Account, they directed ſome previous Exerciſe, not only to throw off ſuperfluous, crude Humours; but to prepare the Body for the Uſe of it.

While the firſt Paſſages are oppreſſed with indigeſted Humours, neither Bath-Waters, Bathing, or the moſt powerful, ſtrengthening Medicines will avail; warm

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* *De Locis in Homine, Sect.* IV.

Stomachic Purgatives, repeated at a proper Diſtance, are then moſt uſeful; and in the ſhort Intervals of tedious, gouty Paroxyſms, nothing will more contribute to prevent the frequent Returns, and to make them more effectual than the *Tinctura Rhabarb. Vinoſ.* either taken alone, or mixed with the *Tinctura Sacra:* when given in a proper Quantity, and going to Reſt, they do not depreſs, but raiſe the Motion of the Blood; and while they diſengage, and ſtrengthen the Stomach, and Bowels, probably often carry off ſome gouty Materials collected in them, and which, from their Weakneſs, and Relaxation, they will be apt to receive. On which Account, when a *latent* Gout in theſe Parts becomes more fixed, and painful, or is ſuddenly thrown on them, Medicines of this Kind give the moſt immediate Relief, and prepare the Body for the Uſe of ſuch as may more effectually determine it to the Surface, and the Joints; among theſe the *Confectio Cardiaca*, *rad. Serpentar*, and *Camphire*, deſerve a principal Place.

EXTERNAL Applications are generally either uſeleſs, or dangerous. I have known ſome remarkable Inſtançes, where Perſons tortured, and almoſt ſpent with ſevere Pain, have received immediate Eaſe from a *Vapour-Bath* of hot Water, retained under an arched Covering over the Veſſel; it comes with the ſofteſt Contact to the Part conveniently placed in it, incapable then of bearing the leaſt Preſſure, mildly attracts, and relaxes, and is at length often ſucceeded with a *local* Perſpiration, an increaſed Swelling, and a more moderate Degree of Pain.

IN a Weakneſs of the Joints, and oedematous Swellings, which are the frequent Conſequences of a continued Gout, nothing more contributes to reſtore their

Strength, than rubbing the Parts with Flannels, impregnated with the aromatic Vapour ariſing *from Olibanum, Maſtich,* and *Succinum,* thrown on Coals, or a heated Iron Plate.

From this general Sketch of the Cauſes, and Nature of the Gout, the Regimen which is neceſſary in *different* Conſtitutions, and *Stages* of it, may be eaſily deduced; and from thence it is evident, that whatever contributes to improve the Digeſtions, and regulate the Diſcharges, and particularly inſenſible Perſpiration, will give the ſafeſt, though a ſlow Relief to gouty Conſtitutions; that where the Digeſtions are entirely impaired, and the Strength is reduced by frequent Returns of the Gout, a *Milk Diet* prudently directed, may prolong Life, and make it more eaſy; that a *mixed* Diet of that Kind, and of animal Food, may be uſeful in other Caſes; that a merely vegetable

table Diet, which is with the greateſt Difficulty aſſimilated into healthy animal Fluids, is therefore moſt improper, and dangerous in gouty Conſtitutions; and that whenever gouty Materials are formed in the fineſt Veſſels of the arterial, and nervous Syſtem, a *regular Paroxyſm* will more effectually *depurate* them, than any other *Diſcharge*; and that in *habitual* gouty Conſtitutions, this painful, though *ſalutary* Irritation, becomes likewiſe in ſome Meaſure neceſſary to throw off other beginning Diſorders, which ariſe from too *languid* a Motion in the *Fluids*.

CHAP. VII.

Of an Atrophy.

AN Atrophy is deſcribed by moſt of the antient, and ſome of the more modern Writers; but in ſuch a confuſed, and imperfect Manner, that it is difficult from thence to aſcertain the different Species of it, or to deduce any rational Method of a Cure: All Atrophies, however variouſly diſtinguiſhed, muſt in the general ariſe from the *Diſcharges* of the Body, being greater than the *Supplies*; in which Caſe, the Solids, and Fluids, muſt unavoidably *waſte*: This may ariſe from a *Defect* of Nouriſhment, from an improper Diet, when the Organs of the firſt Digeſtion are not capable of forming, or ſeparating a ſufficient Quantity of Chyle from it, or from the firſt Excretion, or Diſcharge being too large, or from whatever Cauſe, which prevents a ſufficient Quantity of well-prepared Chyle, to enter the Lacteals, and ſupply Materials of Nouriſhment: But this Want of Nouriſhment, is more owing to particular Defects in the firſt Digeſtion, and Excretion, than to a general bad Habit of Body, and more eaſily admits of a Cure. Neither can a *Cachexy*, or a depraved, vitiated State of the Fluids, be properly conſidered as an Atrophy, as it may often exiſt, without any ſenſible *Waſte*; and much leſs a *Cacochymy*, which is attended with an *Exceſs* of vitiated Humours.

I SHALL therefore endeavour to deſcribe the *different Species* of an *Atrophy*, as ariſing from a more peculiar Fault in the Conſtitution, and in the Digeſtions, and Diſcharges, of which the *nervous Atrophy* is the principal.

In a *Maraſmus*, or *nervous Atrophy*, the Body ſenſibly decays, though a ſufficient Quantity of Aliment is received: The Stomach is rather indifferent, than averſe to Food, ſeldom affected with a *Nauſea*, or Sickneſs, but with a Senſe of a greater Weight, and Oppreſſion after eating; the Pulſe generally weak, and ſlow, the extreme Parts cold, the Body remarkably coſtive, the Urine crude, and in large Quantities, ſometimes with an oily, and lightly variegated Surface, frequent Pains in the Head; and when they go off, a Heavineſs remains in the Parts which were affected, the Spirits gene-nerally depreſſed, and the Sleep imperfect.

Whatever impairs the Strength of the *Body*, or *Mind*, ſuch as large, and ſudden, or ſlow, and continued Evacuaations, particularly from the ſeminal Veſſels, a Suppreſſion of the uſual Diſcharges, Fevers carried off by an imperfect *Criſis*, or too great an Attention, or Diſappointment of the Mind, are apt to bring on this Diſeaſe in Perſons pre-diſpoſed to it; but the more immediate Cauſe is a *Defect*, or *vitiated* State of the *nervous Fluid*, ariſing from Obſtructions in the fine Veſſels of the Brain, and in ſome of the principal Organs of the firſt Digeſtion; by which Means the *Chyle* is rendered *vapid*, and *effete*; and, from the Want of this animating Fluid, the Force of the Heart, and arterial Syſtem, likewiſe become leſs capable of aſſimilating it into healthy, animal Fluids, and of propelling them through the diſtant, decreaſing Veſſels of the third Digeſtion, whence *Nutrition* muſt be deficient, and theſe Veſſels unavoidably *waſte*, and *collapſe*, as there is an Inaptitude in the

Fluids to ſupply Materials of Nouriſhment, and in the Veſſels to receive them: On which Account, *Galen* very juſtly diſtinguiſhes this *Species* of an Atrophy, as being quite oppoſite to that of a hectic Kind, and not improperly compares it to a premature old Age.

Obstructions in the *Liver*, a vitiated State of the Bile, or an Incapacity in that Bowel to prepare, and ſeparate a ſufficient Quantity of it, may often contribute as a *Cauſe*; but muſt generally be the natural *Effect* of ſuch a languid Motion of the Heart, and of a low, depraved State of the Humours: Hence that extreme *Coſtiveneſs*, which always attends this Diſorder, not only from a greater *Inſenſibility* than uſual of the Bowels to the Load; but from a *Defect*, or *Inactivity* of the *Bile*: This *natural Digeſtive* being not only neceſſary for a due Preparation of the Chyle, but to ſtimulate the Inteſtines to a Diſcharge; and ſome remarkable Inſtances have been obſerved of Atrophies of this Kind, where no other Cauſe has appeared.

SOMETIMES this Diſtemper makes a quick Progreſs, in others more ſlow; but if it is not far advanced, and if the principal *Viſcera* are ſound, and not much obſtructed, it may with Certainty be cured by a proper Regimen, though the Effects of it are apt to continue long; but if it is far advanced, and the Body becomes hectic, it then generally proves dangerous, or fatal.

THE principal Indications in this Diſtemper, are to ſtrengthen the digeſtive Powers, and to reduce their Diſcharges to a more juſt Proportion; by which Means the Circulation through the obſtructed Veſſels might be enlarged, and the finer Secretions, particularly that of the nervous Fluid, may be more free, and regular.

WARM, deobſtruent, *ſtomachic* Purgatives, particularly of the *aloetic* Kind, are firſt neceſſary to make the firſt *Excretion* more regular, and to prepare the Body for the Uſe of ſuch alterative Medicines, as would otherwiſe be too active in their Operation: Theſe are beſt taken going to Reſt, at ſuch Intervals, and in ſuch a Quantity, as may only keep the Body ſoluble, without purging, which would increaſe the Weakneſs, and leſſen Perſpiration, already too deficient; on which Account, they may be uſefully combined with *Rhuburb*, which, by ſtrengthning the languid Fibres, will rather promote that natural Diſcharge, than retard it afterwards by an aſtringent Quality. If theſe Purgatives are too inactive in a moderate Quantity, it is more prudent to promote their Operation, by drinking next Morning two or three Glaſſes of *Scarborough* Waters, boiled to half the Quantity, and lightly impregnated with the leſſer Cardamom Seeds, than to increaſe the Quantity of Aloes, or Rhubarb, as the Glands of the Inteſtines are then often obſtructed, and the Secretions from them ſo ſmall as not ſafely to admit ſtrong Irritations, and require ſome diluting Vehicle to make their Operation more eaſy, and effectual.

THE Pains in the Head, Want of Reſt, and the large Diſcharge of crude Urine, generally abate when this Evacuation becomes more regular. Preparations of Medicines of the moderately warm, and bitter Claſs, ſuch as *Summit. Fol. Centauri minoris, Folia Abſynthii maritimi, Cortex Aurantiorum et Limonum, Radices, Gentianæ, Zedoaræ Caſſumanar*, &c. with the milder Chalybeats, will ſtrengthen the firſt, and ſecond Digeſtion, and reduce the Urine to a more juſt, and concocted Proportion; and in ſome Meaſure anſwer the moſt *material Intention*, by enlarging the Blood's Motion through the obſtructed Veſſels, and making the finer Secretions, and the Diſcharge by Perſpiration more free: But this principal View is to be further purſued, by the Uſe of more warm, deobſtruent, and nervous Medicines. Among this Claſs of Medicines, the following are moſt effectual, *Gum-Ammoniacum*, *Opopanax*, *Sagapenum*, *Myrrha*, *Guaicum*, *Camphora*, *Moſchus Balſami Nativi*, *Vinum Chalybeatum*, and ſome of the milder Preparations of *Antimony*. However, the Force of theſe Medicines muſt be increaſed with Caution, leſt by their too great Activity, the Head may be affected, and the *glandular Obſtructions*, by not yielding to the increaſed Preſſure, be apt to degenerate into a *purulent* State.

I AVOID giving particular Forms of Medicines, which muſt be always adapted to the particular Circumſtances of the Patient; and where the *Indication* of Cure is *rightly fixed*, it is eaſy to ſelect, and combine from theſe Claſſes of the *Materia medica*, ſuch Forms as are moſt agreeable, and effectual.

DURING ſuch a Regimen, three, or four Spoonfuls of a grateful, nervous Infuſion in Wine, particularly of the *Marum Syriacum*, and *Fol Salviæ*, with a ſmall Quantity of *Sem. Cardamom min.* taken going to Reſt, greatly contribute to promote the *laſt Digeſtion*, and the Diſcharge by *Perſpiration*, which are always beſt carried on in ſuch Conſtitutions by Warmth, and Reſt; and it is obſervable, that this material Diſcharge is always deficient, when the Stomach is too much loaded, or too cold, and empty.

When the Head becomes free, and the Obſtructions are in ſome Meaſure diſengaged, the *Bath-Waters*, under a proper Regimen, may be taken with great Safety, and Benefit; as they may in all Caſes, where the Digeſtions are impaired, and the Circulation is too languid.

The Diet ought to be ſtrengthning, light, and generous, and chiefly of the ſolid Kind. Beef, and Mutton generally agree better in theſe Caſes, than a weaker, and more viſcid animal Food: Shell-Fiſh is often particularly agreeable to their Stomach, and highly nouriſhing. The light, red *French* Wines agree beſt, plain, and diluted: *Quantities* of any Kind are to be carefully avoided, which are apt to oppreſs, and make the Diſcharges irregular. When the Stomach cannot well bear a ſufficient Quantity of ſolid Food; a Beef-Broth may be ſubſtituted, made in the following Manner:

Cut a Pound of the lean Part of the Buttock of Beef into very thin Slices, or rather Shreds, put it over a quick Fire, with a ſufficient Quantity of Water; as it grows hot, take off the riſing Scum, and do the ſame while 'tis boiling, which is to be continued only twenty Minutes: When it is cold, decant a Pint from this Pound of Beef, which looks like a light Infuſion of fine Green-Tea, has a very grateful Flavour, and is more ſtrengthning than ſtronger Broths, which loſe their finer Parts in long Boiling, and is lighter on the Stomach than Chicken Broth; a Tea-Cup of this may be ſometimes taken with great Advantage, and in moſt low Conſtitutions, is preferable to Broth made from dried Vipers.

But nothing is more neceſſary to make this Regimen effectual, than Exerciſe, ſuited to the Strength of the Conſtitution, either on Horſe-Back, or a Wheel-

Carriage: Walking is the moſt general Exerciſe of the Muſcles, but is apt to fatigue, and muſt therefore be very moderate, and gradually increaſed: But no Exerciſe is ſo remarkably ſerviceable in this Diſtemper, as a moderate Sea-Voyage, at no great Diſtance from Land, eſpecially when made in a more warm Climate: On which Account, a Change of Situation to a more warm Air, and a more dry Soil, is particularly uſeful to ſuch Perſons.

WARM Bathing, is particularly recommended by moſt Authors in this contracted, dry State of the Veſſels, and would certainly be very uſeful, if properly directed, otherwiſe it may be prejudicial; for it is not only neceſſary that the *internal* Veſſels ſhould be firſt in ſome Meaſure ſtrengthned, and diſengaged from Obſtructions; but that it ſhould be tempered with a Degree of *Heat*, and

Preſſure ſuited to the Conſtitution. In the ſevere Seaſons of the Year, and in weak Conſtitutions, I ſhould prefer dry Frictions of the whole Body, and particularly of the Spine, and of the extreme Parts, *Celſus* * lays ſuch a Streſs on relaxing the external Skin by warm Bathing, that he likewiſe adviſes graſping, and ſtretching it, and applying Cupping-Glaſſes to diſengage it from its cloſe Adheſion to the Parts under it; but ſuch Applications are uſeleſs, and ineffectual, and directed without any juſt Regard to the real State of thoſe Veſſels, which are rather *collapſed* from Emptineſs, than *contracted* from an Increaſe of their Tone, or Spring; and when the Force of the Heart, and arterial Syſtem is ſufficiently ſtrengthned, and ſupplied with proper Materials of Nouriſhment, theſe *flaccid* Veſſels will eaſily yield, and be *repleniſhed*.

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* *De Tabe. Cap.* III. *Lib.* 22.

BATHING the Feet is very uſeful, and often contributes to promote Reſt, and to keep the Head more free from Pain; but in theſe *nervous Head-Achs*, nothing is more uſeful than to let the *Hair grow* at leaſt two or three Inches, to comb it often, and never to ſhave it: This is agreeable to the Rule given by *Celſus* *. In this Diſtemper the Hair is particularly apt to fall off, from the Want of ſufficient Heat, and Moiſture, as it is in old Age, which is an incurable Atrophy. The Hair is certainly the beſt natural Defence to the Brain, the Seat of Life, and Motion; and not only gives the moſt proper Warmth, but draws off ſuperfluous Humours. In young ſtrong Perſons, where the other Diſcharges are free, the Head may be kept ſhaved with Safety, and in ſome Caſes with Advantage; but in cold, languid Conſtitutions, no other

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* *Caput leviter perfricare nunquam tondere. L.* III. *C.* 4.

Covering can be well ſubſtituted in its Place: In the advancing Years of Life, I have known many Inſtances of Head-Achs, and Defluxions, particularly on the Eyes, which have been relieved by letting the Hair grow, when other Methods have been ineffectual.

ANOTHER more imperfect Species of an Atrophy, which is very frequent in theſe Iſlands, is owing to a *relaxed State* of the Veſſels, and particularly of the *Lungs*, where the firſt Digeſtion is not remarkably deficient, and a ſufficient Quantity of proper Nouriſhment is changed into laudable Chyle; yet is not afterwards juſtly *aſſimilated* into *Serum*, which likewiſe muſt continue in too great a Proportion to the Blood from the Want of a ſufficient Action of the Veſſels on it, to unite its globular Parts. In theſe Circumſtances the ſmall decreaſing Veſſels of the *third Digeſtion* will unavoidably be more loaded with theſe diſſolved Humours, and *profuſe Sweats* will be the neceſſary Conſequence; Perſons thus affected, ſoon become weak, and languid, and the finer Parts of the Fluids being thus diſcharged, the remaining become more acrid, apt to ſtimulate, and to form Obſtructions; the Pulſe at ſometimes becomes more quick, and after the Sweats more ſlow, and languid; the Urine often crude, and at other Times loaded with a *lateritious Sediment*, with a variegated, oily Surface.

PERSONS of a *relaxed*, delicate Conſtitution, who have weak, though ſound Lungs, who live an inactive, or irregular Life, or take too great a Quantity of weak Liquids, in Proportion to ſolid Food, or who have uſed too freely *Mercurial* Medicines, are more particularly ſubject to this Diſorder.

If it is attended only with this relaxed State of the Veſſels, and Humours, and is not too far advanced, it may with Certainty be cured; but if too long neglected, and the Humours become *acrid*, and *vitiated*, they will be apt to form Obſtructions in ſome of the *Viſcera*, and particularly in the Lungs, attended with a Cough, which, if not prevented in its Progreſs, ſoon terminates in a fatal *Phthiſis*.

The Indication of Cure, is to *ſtrengthen* the Organs of the *firſt*, and particularly of the *ſecond Digeſtion*; and by increaſing their Action on the contained Fluids, to give a more firm Conſiſtence, and Union to them.

The Peruvian Bark, with its Preparations, deſerves a principal Place in this Diſorder; light, moderately warm, and ſtrengthning Bitters, and the *Elixir* of

Vitriol; and when the Symptoms are abated, nothing more powerfully contributes to confirm the Habit of Body, than a mild, chalybeat Courſe, with the *Cort. Peruv.* and *cold Bathing*; but until the *internal* Parts have been firſt ſtrengthned, cold Bathing will not only be ineffectual, but dangerous.

If the Stomach, and Bowels are affected, Rhubarb, and ſome of its Preparations, will be neceſſary in moderate Quantities, and at proper Intervals.

The Regimen of Diet, ought to be directed with a View to ſtrengthen, but not to irritate, and heat too much; the milder white Meats roaſted, are preferable to any other of the animal Kind; light, *French* red Wines, that have not by Age loſt their grateful Aſtringency, are the moſt proper, plain, and moderately diluted. *Quantities* of any Kind, are to be carefully avoided, and the Meals to be more divided at a proper Diſtance; for relaxed Fibres, can never recover their Tone, when kept in a diſtended State. Milk, eſpecially when mixed with the *German* Waters, may be taken with great Benefit, as it requires leſs Powers in the Digeſtions, than any other Aliment, to aſſimilate it into healthy, animal Fluids.

If the Sweats are large in the Morning, warm, dry Linen ought to be put on as ſoon as they abate; and the Body well rubbed with dry Flannel Cloths, impregnated with the aromatic Vapour ariſing from *Olibanum*, *Maſtiche*, *Thus*, and *Succinum*, thrown on clear Coals: A large Fire, and too many Coverings at Night, ought to be avoided; and in the Day, the Body is better defended by light, cloſe Cloaths, than by a more looſe, and heavy Covering. Theſe are the neceſſary, and the moſt powerful Preſervatives of this Kind againſt Night-Sweats.

Sydenham recommends *Riding* as a Specific, in preventing the waſting Sweats which attend a Phthiſis. In this Species of a Decay, it may indeed juſtly deſerve that Character, but falls very ſhort of it in ſuch Sweats as ariſe from a *purulent Hectic*.

Another Species of an Atrophy, very different from the former, is attended with a latent, hectic Fever, irregularly intermitting, which in ſome Time becomes more intenſe, and conſtant, and gradually preys on the Body, though a ſufficient Quantity of proper Nouriſhment is taken, and though no ſenſible Evacuation attends it in its firſt Stage.

This is owing to ſome *purulent*, or *ſanious* Matter latent within the Body, which *abſorbed* into the Blood, will always in Proportion to its *Quantity*, and *Acrimony*, excite this waſting, parching Fever. It moſt frequently ariſes from *glandular Obſtructions* which have ſlowly degenerated into a purulent State; ſometimes from a *latent Abſceſs* in ſome of the more principal *Viſcera*, or from Bones rendered *carious*, by a *venereal*, or *ſcrophulous* Taint. Books of Obſervation abound with Inſtances of ſuch as died of this Species of an Atrophy, which in its Progreſs generally terminated in an evident Ruin, and Devaſtation of the Parts, which were at firſt more obſcurely affected.

As this Diſtemper moſt frequently ariſes from a previous bad Conſtitution; and as the Abſceſſes formed ſeldom admit of external Aſſiſtance, and are apt to form *ſinuous* Ulcers, it muſt in ſuch Caſes be always fatal; but if the Habit of Body is not bad, or much reduced, if the Abſceſs will admit of an external Opening, or breaking inwardly forms no ſinuous Ulcer, if the external Glands of ſome of the Viſcera, leſs neceſſary to Life, are only affected, it is leſs dangerous, and often admits of a Cure.

As this Atrophy is a true Phthiſis, it will require the ſame Method of Cure, which will be more fully deſcribed in a Conſumption of the Lungs; for in whatever Part of the Body, either from an Abſceſs, or Ulcer, a ſufficient Quantity of purulent Matter is formed, and abſorbed, a true Phthiſis will thence enſue; and though from its different *Situation*, its *Progreſs*, and *Symptoms* will vary, the Indications of Cure will be always the ſame, peculiar Regard being had to the *Parts affected.* As the Lungs are neceſſary to the moſt material Functions of Life, and to give a due Conſiſtence to the Fluids; and as their Texture is tender, an Abſceſs, or Ulceration formed in them muſt be generally attended with a *purulent Diſcharge*, a *diſſolved* State of the

Fluids, profuſe Sweats, and a quick Decay; whereas, in Parts leſs neceſſary to Life, eſpecially when attended with a more *viſcid* State of the Blood, the Progreſs is more ſlow, and leſs attended in their *firſt* Stages with any *ſenſible* Evacuation.

THE *Goat's Whey*, which is impregnated with vulnerary, and aromatic Herbs, which grow on high, dry Mountains, is the moſt powerful Remedy in this Kind of Atrophy, eſpecially when it ariſes from *purulent*, *glandular* Obſtructions, attended with an *inflammatory* Diſpoſition in the Blood. The Mountains of *Mourne*, in the County of *Downe*, in *Ireland*, are remarkable for furniſhing Herbs, and Goat's Whey of that Kind. It muſt be taken in large Quantities, two or three Quarts in a Morning, and has been often attended with ſurpriſing Succeſs in many Caſes, which otherwiſe muſt have proved fatal.

CHAP. VIII.

Of the Structure, and Uſe of the Lungs.

THE *Lungs* are formed for a Two-fold Uſe, *Reſpiration*, and *tranſmitting* all the *Humours* of the *Body* through them, and have peculiar *Organs* deſtined for theſe Uſes; ſo that their Subſtance is chiefly compoſed of *aerial Tubes*, and *ſanguiferous Veſſels*.

THE *aerial Tubes* are divided into four Parts, the *firſt* is the *Larynx*, which gives a Paſſage to the Air, whoſe Aperture is occaſionally cloſed by the incumbent *Epiglottis*, and by *Muſcles* peculiar to it, by whoſe voluntary Action it becomes capable of retaining the Air, and by its different Degrees of *Contraction*, modulates, and varies the Voice; the *ſecond Part* is the *Trachæa*; the *third*, where it begins to divide, and loſes that Name, the Ramifications are then called *Bronchia*; the *fourth Part* conſtitutes the *Cellules*, and *Veſſicles*, diſcovered, and deſcribed by *Malpighius* *.

THE ſanguiferous Veſſels are the pulmonary Artery, the pulmonary Vein, the two bronchial Arteries diſcovered by *Ruyſch* †, and their correſponding Veins, the right of which terminates in the Vena Azygos, the left in a Branch of the Subclavian: The Nerves which are diſperſed through the Lungs, proceed from the Intercoſtal, and eight Pair.

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* *Malpig. de Pulm. Epiſt.* 1, 2. *T.* I. *Fo.* 1, 2, 3.

† *Reſp. ad Epiſt. Anat. Problem.* 6.

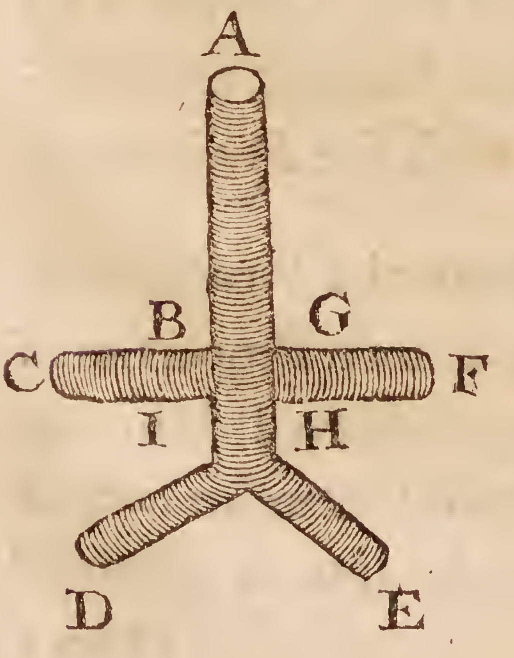
The *Trachæa Arteria* is compoſed of cartilaginous Rings, connected by muſcular Membranes; hence it becomes ſufficiently flexible to yield to the Motions of the Neck, and at the ſame Time firm enough to reſiſt an external Preſſure, which otherwiſe would have endangered a Suffocation: Internally it is covered with a *glandular Membrane*, and lubricated with a Mucus, thence ſeparated to defend it from the immediate Contact of the Air. The cartilaginous Rings of the Trachæa, are left open behind, that they might not obſtruct the *Oeoſophagus* in Deglutition; the intermediate muſcular Rings that join them together, are by ſome called the *Muſculi Meſochondriaci*; by their Diſtention, the Trachæa is lengthned whenever the Neck is diſtended; and the Spring, and Force of the Lungs in their more diſtant Diſtribution through them, is in a great Meaſure owing to their Endeavours of *con-*

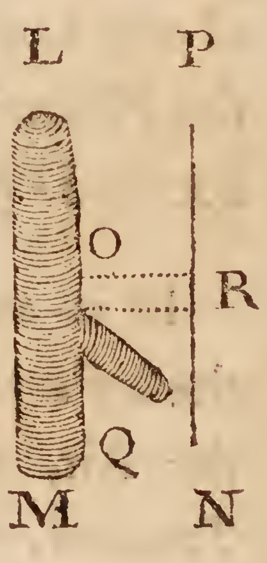
tracting themſelves, and bringing the Cartilages nearer to each other.

THE Trachæa enters the *Thorax*, between the Membranes of the *Pleura*, and when it deſcends as far as the fourth Vertebra of the Back, it divides into two Branches, each of which is again ſubdivided into innumerable Ramifications, which go off at *acute* Angles, and gradually become ſmaller, and leſs cartilaginous, until at laſt they terminate in fine membranous Veſicles; from a Collection of ſeveral ſuch Veſicles, ſmall Lobules are formed, and from a greater Collection of theſe Lobules, the Lobes of the Lungs, which are inveſted with the *Pleura* in the ſame Manner as the abdominal *Viſcera* are with the *Peritonæum*.

IT is evident, from the Structure of theſe *Parts*, and the known Properties of the Air, that being received into the *Trachæa*, and its ſeveral *Ramifications*, it will diſtend the *Veſicles* into a *ſpherical*

Form; by which means their mutual Contact will be diminiſhed, the *orbicular Capacity*, and *Longitude* of the *Cartilages* will be increaſed, and the acute *Ramifications* will riſe into *Angles*, approaching nearer to *right Angles*: This Alteration is moſt neceſſary; for by that Means a greater Quantity of Air is contained in a ſhorter Space, than when their *Angles* were more *acute*; which may be thus demonſtrated, Let A. B. be the *Aſpera Arteria* firſt divided into Branches, C. B. and G. F. which conſtitute the ſuperior Lobes, and into others I. D. and H. E. which conſtitute the inferior Lobes, I ſay that theſe Angles,





when the Lungs are inflated with Air, will be increaſed; for if L. M. is the Trunk from whence ariſes the Branch O. Q. let P. N. be drawn parallel to L. M. It is plain from the 35th *Propoſition* of the firſt Book of *Euclid,* that the *Parallellogram* O. R. is equal to any *Paralellogram* which is extended from L. M. to P. N. ſtanding upon the ſame or an equal Baſis: But the Parallelogram O. Q. is not extended to N. therefore the nearer it approaches to O. R. the more Air may be contained in a ſhorter Space.

WHEN theſe *Tubules* are therefore inflated with Air in *Inſpiration,* the ſeveral *Ramifications* recede more from each other, through the whole Subſtance of the *Lungs,* and their Angles become larger; by which Means the *Lobes,* with all their various Branches, are then more erected.

If the Lungs be placed in a *Vacuum*, and a Paſſage contrived to admit the external Air into the *Trachæa*, they immediately become greatly diſtended; but that ſtill they reſiſt, and endeavour to contract, is moſt evident for whenever the external Air is admitted, they inſtantly ſubſide; or if they are ſuſpended in the Air, they ſoon reduce themſelves into a ſmaller Space than they poſſeſſed in a human Body. Hence the Manner may be explained, in which Reſpiration is performed in a human Body.

Whenever the intercoſtal Muſcles act ſingly, or in Conjunction with others inſerted into the Thorax, and raiſe the Ribs, at the ſame Time that the Fibres of the Diaphragm contract, and approach to ſtrait Lines, the Capacity of the Thorax will be increaſed in all its Dimenſions: When this Dilatation is made, the Preſſure of the Air ruſhing into the Trachæa,

chæa, being greater than the Reſiſtance of the Lungs, diſtends them gradually, until their convex Surface is almoſt always in Contact with the concave Side of the *Pleura*; and the Reſiſtance of the one is exactly equal to the Preſſure of the other.

By theſe Means the Lungs will be always dilated, in Proportion as the Capacity of the Thorax is enlarged, and all their Veſicles diſtended with Air; at which Time the Blood will circulate more readily through the fine Veſſels, which are ſpread over their Surface, until the Air confined in theſe Cavities, by being *heated*, and *expanded*, preſſes ſo much on them, as to obſtruct the free Circulation through them, at the ſame Time that it becomes more *effete*, and loſes that *animating Spirit*, which is neceſſary to the Life of Animals: Hence an uneaſy, and increaſing Senſe of Suffocation muſt be perceived, and a *neceſſary Relaxation* of the Muſcles of Inſpiration ſucceed: Whenever this Effect is thus produced, the *elaſtic,* cartilaginous Segments, which are connected with the Sternum, immediately *recover* their natural Situations; at the ſame Time likewiſe the *abdominal* Muſcles protrude the Bowels againſt the relaxed *Diaphragm,* and by their Action not only confine the *Thorax,* but in greater Expirations contribute to depreſs the Ribs, which is farther aſſiſted in voluntary Expirations by the Action of other Muſcles.

When the Thorax is thus contracted, the free Circulation through the capillary Veſſels of the Lungs begins to be again obſtructed from the Veſſels continuing more *collapſed,* and from ſome Parts of rarified, and effete Air remaining in them; to remove which uneaſy Senſation, *Inſpiration* becomes neceſſary, and a new Admiſſion of freſh Air.

Hence it is evident, that when once the Lungs of an Animal have been diſtended with Air; Inſpiration, and Expiration muſt alternately ſucceed each other while Life continues, which muſt ceaſe whenever they are either kept *diſtended* with Air, or *collapſed* from the Want of it.

The Action of the *cartilaginous Segments,* joining the Ribs to the *Sternum,* is the only *Antagoniſt* the *intercoſtal Muſcles* have; for they always reſiſt the Force of theſe *Muſcles,* endeavouring to raiſe them, and make their Angles larger. This *Fabric* was abſolutely neceſſary, becauſe *Reſpiration* is ſucceſſive, and could not poſſibly be performed by *antagoniſt Muſcles*; for as ſuch they muſt act alternately: But all the Nerves deſigned for *voluntary, muſcular Motion,* have, for the moſt *Part,* the ſame Origin; and in the Time of Sleep, when *Reſpiration* is *involuntary,* there is an *equal Influx* of Spirits into all the Nerves; and conſequently all *muſcular Motion* muſt be then *equal*, not *ſucceſſive*; but theſe *Cartilages* perpetually retain their *Spring*, and Action, even in a dead Body; and whenever the Cauſes that dilate the *Thorax*, ceaſe to act, by their *elaſtic Action* it is immediately depreſſed, and contracted, and by this ſurpriſing *Mechaniſm*, this *perpetual Motion* is ſuſtained.

THE *Heart*, likewiſe, is a Muſcle, whoſe Motion is *perpetual*, and *ſucceſſive*; while other Muſcles are ſometimes at Reſt, and ſometimes in Motion; and is ſo wonderfully contrived, that the ſame Cauſe which deſtroys its *Contraction*, reſtores its *Dilatation*, by which Means each is mutually continued; for the *conic Form* of the *Arteries*, and their *muſcular Membranes*, ſupply the Place of an *Antagoniſt*: On which Account, whenever the *Heart* by its Contraction, expels the

Blood into the *Aorta*, by the Reſiſtance which the *conic Form* of this *Veſſel* gives to its Motion, it is repelled, and in that Inſtant fills the *coronary Arteries*, which are diſperſed through the Subſtance of the *Heart* with Blood, while its Nerves receive a free Influx of animal Spirits, from the *Cerebellum* (for no Obſtacle oppoſes): But at the ſame Moment the *Heart* is thus fully contracted, the *Auricles* are relaxed, and *diſtended* with Blood; by which Means the Cauſe of its Contraction immediately ceaſes; for the Motion of the *nervous Fluid*, that would otherwiſe continue to flow into the *Heart*, is now prevented by this *Preſſure* of the Blood in the diſtended *Auricles*; for *Lower* *, and *Willis* †, have ſhewn, that the Nerves which arive to the Heart, paſs either through the *Auricles*, or near the *Aorta, or pulmonary Artery*; ſo that when they are filled, and diſtended with Blood, theſe *Nerves* muſt be *compreſſed*, and for that Moment the Heart muſt become *paralytic* from the *Want* of a ſufficient *Influx* of *animal Spirits.* Hence the *Auricles*, no longer receiving any Oppoſition, contract, and evacuate the Blood into the *Heart*, which eaſily yields to it, and becomes diſtended; and at the ſame Time it receives this Blood, (by receiving likewiſe the *nervous Fluid*, whoſe Motion is now free, and Blood into the *Coronaries*) it recovers a Capacity for a ſucceeding Contraction.

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* *De Cordis Situ & Structura*, C. I.

† *Nervorum Deſcriptio & Uſus*, C. XXIV.

DR. *Haller* * aſſerts, that there is no ſuch Preſſure on the Nerves in the Auricles; and that the coronary Arteries are *diſtended* with Blood, not *alternately*, but at the ſame Time with the whole *arterial Syſtem*, and during the *Contraction* of the Heart.

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* *Pimæ Lineæ Phyſiolog. Cap. de Corde.*

To prove the firſt Poſition, he gives an Inſtance in Fiſhes who have no Auricles, and that conſequently the alternate Motion of their Heart cannot depend on the Preſſure of the Nerves on them; but as the Structure of their Heart is very different from that in human Bodies, may not ſuch a Preſſure be made on the cardiac Nerve in ſome other Part of its Direction to the Heart?

To prove the other more material Objection, he ſays, that having cut the coronary Arteries, he obſerved, that during the Contraction of the Heart, the Blood ſprung up at a greater Height from theſe opened Veſſels, which muſt conſequently be diſtended, at the ſame Time, with the others of the arterial Syſtem.

THE Motion of the Heart in a dying Animal, irritated with Pain, is ſo *very quick*, that it is difficult to diſtinguiſh be-

between its Pulſations, and almoſt impoſſible *that Point* of Time when the Aorta firſt begins to *contract*, and the Heart to *fill* again, in which the Blood receives its ſhort retrograde Motion; for whenever the Blood is expelled from the left Ventricle, from the conic Form of the Arteries, it muſt unavoidably meet with a Reſiſtance, and would *return* into the *Ventricle*, unleſs prevented by its *Valves*, which then *cloſe* it, and leave the opened Orifices of the coronary Arteries free to receive their Blood, *repelled* that Inſtant, by the beginning *Contraction* of the Aorta. This is evident, from the Structure of theſe Parts, and ftom repeated Obſervations; and how is it poſſible that the ſame Contraction, or Force of the Heart, ſhould give the Blood a *direct* Motion through the *Aorta*; and a Motion almoſt quite *oppoſite* to it, through the coronary Arteries? As this Opinion is ſingular, attended with inexplicable Difficulties, and different from what *Boerhaave* * firſt advanced, and the moſt accurate Anatomiſts have received, it will, I think, require more *certain*, and *exact* Experiments to ſupport it.

Dr. *Haller* then proceeds to explain this alternate Motion of the Heart from the *irritable* Nature of that Muſcle, and the *Stimulus* of the Blood ſucceſſively *diſtending* the Auricles, and Ventricles: This, he ſays, is a ſimple Cauſe, but ſufficient to produce that Effect; but though the Heart is formed with the greateſt Senſibility, it muſt from the repeated Action of the *ſame Stimulus*, become by Degrees *leſs ſenſible* of it, and want that uniform Power which is neceſſary to continue the Circulation: The wiſe Creator therefore has not left the Motion of this Muſcle, on which Life immediately depends, ſo weakly guarded; but has ſupported it by

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[*] *Inſtitutiones Medicæ*, 409.

an Influx of the nervous Fluid into its Fibres, and of Blood into the Coronaries, and Ventricles. Theſe *concurring* Cauſes are only ſufficient to preſerve the Motion of the Heart, and an *alternate* Interruption of them to make it *ſucceſſive.*

Some have admired why the Motion of the *Heart*, and that of *Reſpiration*, is not performed in the ſame Space of Time; but it has been ſhewn, that the Action of the former depends on the ſucceſſive Influx of the nervous, and arterial Fluid into the Subſtance of the Heart, and of Blood into its Cavity; which laſt only is derived from the *Lungs*, and which are capable of containing ten Times the Quantity of Blood, which the *left Ventricle* of the *Heart* can contain. Hence in the full Point of Inſpiration, when the *Lungs* are almoſt in a State of Reſt, and its *Arteries* are ſo much compreſſed, that the Blood cannot freely paſs into the

Veins, the *Heart* is ſtill ſupplied with Blood from the *pulmonary Veins,* which, according to the former Computation, contain a ſufficient Quantity to repleniſh the *Heart* five Times. This is the Reaſon why if the *Air* be ſtrongly retained in the *Lungs,* the Motion of the *Heart* is perceived to be very ſenſibly languid after the fifth *Pulſation.*

THE Circulation of the Humours is quicker through the *Lungs,* than through any Part of the Body; for as great a Quantity paſſes through them in the ſame Space of Time, as through all the other Parts of the Body; for all the *Arteries* receive their Blood from the *Aorta,* this from the left Ventricle of the *Heart,* and this from the *Lungs*; therefore, if two Ounces of Blood are expelled from the *Heart* at each Pulſation, the ſame Quantity muſt neceſſarily paſs through the *Lungs* in the ſame Space of Time; otherwiſe

wiſe a fatal *Peripneumony* would ſoon ſucceed: Therefore if the *Heart* be ſuppoſed to contract ſixty Times in a Minute, *one Hundred and Twenty Ounces* of Blood (according to this Computation) muſt paſs through the *Lungs* in that Space of Time. And on this Account, when the *pulmonary* Artery is wounded, three or four Pounds of Blood are often evacuated in the Space of a Minute.

The pulmonary Arteries receiving the circulating Humours, *divide* them into as many different Parcels as there are Ramifications, whoſe Number is almoſt infinite; theſe minute, arterial Ramifications terminate in Veins, which, by Degrees uniting, become larger, till at length they end in four large Branches, returning from the four different Lobes, which joining together form the *Saccus Lowerianus*. By this Structure the Humours, that were before *ſeparated* in the Ar-

Arteries, are afterwards intimately *mixed* in the *Veins*: Hence *Malpighius* [*] affirmed, that the chief Action of the *Lungs* conſiſted in *mixing* equally the hetorogeneous Parts of the Blood; and that in a Drachm, or any given Quantity of the Fluids which circulate through them, there will be a proportioned Mixture of the ſeveral Humours contained in the Blood. *Borellus*, [‡] oppoſing this Opinion of *Malpighius*, aſſerted, that the Action of the Lungs conſiſted in *ſeparating* the Humours; the moſt exquiſite Separation being performed, when the Blood, or any heterogeneous Fluid, paſſes from a large Tube through ſmall Ramifications: But their Opinions, though very different, may be eaſily reconciled, being each of them partly right; for the circulating Humours, by the *Structure* of the *Arteries*, are *ſeparated*, and by that of the Veins are again moſt intimately *mixed* together; and by this uſeful Mechaniſm, the *new, viſcid Chyle* received into the *Blood*, which otherwiſe would be apt to run into *Coheſions*, is attenuated, and all the circulating Humours are preſerved in a juſt Degree of *Fluidity*.

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[*] *Opera Anatom, P.* 325.

[‡] *De Motu Animal. Pars* II. *Prop.* 108, 109.

THESE Advantages are likewiſe greatly promoted by the Preſſure of the *Air*, on the Veſſels of the *Lungs*, being ſo perpetually varied, that they never continue of the ſame Form, for two ſucceſſive Moments of Time: For in *Inſpiration* their Expanſion, and the Preſſure of the Air on them, gradually increaſe, and in the ſame Proportion decreaſe in *Expiration*; and when the Air is retained in the full Point of *Inſpiration*, its increaſing Rarifaction ſtill continues the Change; and ſince the Capacity of theſe Veſſels is perpetually changed, it is probable that by this Means the Humours paſs through, and are prepared in the *Lungs*, for all the different *Secretions*, which are afterwards performed in the whole Body; for all Secretions are made from the ſame Blood, and in a great Meaſure receive their different Properties from the different Capacity of the ſeparating Veſſels; and ſince theſe Veſſels from their greateſt Capacity, which is *circular*, are gradually compreſſed, and changed into a *plane* Figure, they muſt therefore likewiſe paſs through all the various intermediate Degrees.

It is evident, from what has been laid down, that the moſt neceſſary Functions of the animal Oeconomy, depend on the Influence of this Organ; and that likewiſe the *Heat*, *Colour*, and the moſt material Properties of the Blood are chiefly owing to the Lungs.

For it is obſervable, that Animals who want Lungs, ſuch as Fiſhes, are al-

always *cold,* and the greater the Reſpiration (or the Action of the Lungs) is, the greater likewiſe is the Degree of Heat; for in a human Body the Force of Heat increaſes in Proportion to that of Attrition, and this to the Force of Circulation, which is as great through the Lungs as through all other Parts of the Body: Hence, in Regard to the Force of *Attrition,* there is the greateſt *Heat,* but in Reſpect of the *Air* the greateſt *Cold.* The one is juſtly corrected by the other; for the Force of *Attrition* in theſe Parts, is ſo very violent from the *Preſſure* of the Air, and the *Velocity* of the Blood's Motion, that Health could not long ſubſiſt, if it was not thus *moderated* by a proper Diſpoſition of theſe Veſſels, in being ſo much *expanded,* and by an *oppoſite Quality* in the Air.

For the *Refrigeration* of any Body is proportioned to the *Expanſion* of its *Surface,*

face, and the *Denſity* of the *Medium*, (as Sir *Iſaac Newton* has obſerved) and if any Body of a ſmall Surface, warmed to a great Degree, is extended into a large Surface, and placed in a more *denſe Medium*, it will, in Proportion to that Alteration, more quickly abate of its Heat: And for the ſame Reaſon, the Heat of the Blood in the Lungs muſt be much diminiſhed, and moderated, by being *expanded* on a large *Superficies*, and expoſed to the Influence of the *Air*, whoſe Heat, in the moſt warm Weather, is leſs than that which is natural to a human Body; and by being renewed every Inſpiration, its *Denſity* is kept up in full Force; for that which is expired by being *rarified*, and warmed by the Heat of the Body, is not ſo capable of cooling the Blood, if received again into the Lungs, as freſh Air.

HENCE appears the Reaſon, why *Wind*, which is only Air renewed, or a Change of Atmoſphere is ſo cooling? for Wind is not actually more cold than any other Part of the *ſame* Air; and the moſt ſenſible *Thermometer* expoſed to the Wind of a large Bellows, receives from thence no Alteration; but the circumambient Air of human Bodies, is ſoon rendered by their Heat not only more warm, but more *light*, and *rarified*, and conſequently leſs capable of *attracting* Heat from them, than ſuch Air as is placed beyond their Sphere of Activity.

Hence likewiſe appears the Reaſon, why the *vital Heat* is more ſtrong, and laſting in robuſt Conſtitutions than in others, their Humours being more *denſe*, and their Veſſels more *elaſtic*; and from thence not only capable of *exciting* a greater Heat, but of *attracting*, and *retaining* it longer than weaker Bodies: For though *Attrition* excites Heat, by *collecting* that *elementary* Fire which is difdiſperſed through every Part of Space; and though this *Collection* be proportioned to the *Elaſticity*, and *Velocity* of the Bodies in Motion, yet its *Retention* is always proportioned to the *Denſity* of Bodies.

SIR *Iſaac Newton** ſuppoſes, that not only the *Collection*, but the *Retention* of Fire, or Heat in any Body, depends on the *oſcillatory Motion* of all the Parts of that Body which is warmed; he ſuppoſes likewiſe, that there is an *attracting* Force between the *corporeal Subſtance*, and *Fire*, or the Rays of *Light*; and that when this Particle of Fire is in a perfect *Vacuum* its Motion is very ſlow, but that the nearer it approaches to any Body, the more it is *attracted* by it, and its Velocity is increaſed in the ſame Proportion, which is always greateſt at the Point of *Contact*, from whence it is inſtantly repelled; that from hence an Action, and

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* *Optics, Q.* V. *P.* 314. *P.* 255.

Re-action ariſe, which produce *oſcillatory Motions*; and that the Force of Heat continues in Proportion to the Violence, and Duration of theſe *Vibrations*: But as this *great Man* was ſenſible, that more Experiments were neceſſary to aſcertain the Truth of theſe Poſitions, and as he was prevented from proſecuting them, he ſubmits them to a farther Enquiry; and it appears from evident Experiments, that notwithſtanding elaſtic Bodies are moſt capable of collecting Heat by *Attrition*, and that this may be probably the chief Cauſe which excites it in a human Body; yet this *Collection* of *Fire* in other corporeal Subſtances, may be owing to other Cauſes: But whatever the different Cauſes are, which *determine*, and communicate Heat to Bodies, it is always *retained* in ſuch Bodies, not in Proportion to their *Elaſticity*, but in Proportion to the *Quantity of Matter*, and *ſpecific Gravity* of ſuch Bodies; for if

Gold, *Mercury*, *Lead*, and *Water*, are placed in the ſame Degree of Fire, their different Heat will be proportioned to their *different Denſities*; and no Bodies are certainly leſs capable than theſe two laſt of exciting *elaſtic Vibrations*.

THE greater the *Denſity* of a Body is, the greater likewiſe is the Difficulty to *communicate* Heat to it, but when *communicated*, it is the longer *retained*; whereas to Bodies of a reverſe Nature, it is eaſily *communicated*, and as quickly goes off. This is the Reaſon why Perſons of a weak Conſtitution, are, from a ſmall Force of Heat, for a ſhort Space of Time immediately fluſhed, and warmed; for Weakneſs is nothing elſe but a *Relaxation of the Solids*, and a *Levity* in the Fluids.

NOTHING is more ſurpriſing, and perhaps more difficult to explain, than the

Heat of the Blood in animal Bodies: for the moſt violent Agitation of any other Fluid is not capable of exciting ſo great a Force of Heat: The following Cauſes, which can never concur in any other Fluids, may perhaps be ſufficient to produce it. The particular *Elaſtity*, and *Spring* of the *Solids* of *animal Bodies*, the *conic Form* of the *Arteries*, their *Ramifications*, the various Motions, and Repercuſſions ariſing from hence, muſt all produce a more exquiſite *Attrition*, than any artificial Motion can poſſibly excite. 2dly, The *animal Spirits* in ſeveral Parts of the Body, mixing with the Blood, which, from their elaborate *Secretion*, the ſurpriſing *Activity*, and Minuteneſs of their Parts, ſeem to be ſomewhat *analagous* to the *Rays of Light*, or *Particles of Fire*. 3dly, The *Denſity* of the *Globules* increaſed by being compacted by the Action of the Veſſels, and their *ſpherical Form*, containing the greateſt Quantity of Matter in the ſmalleſt Space, makes them capable of *retaining* their Heat the longer. 4thly, By being oleaginous, they are apt to receive, and retain a greater Degree of Heat than other *Fluids*; for Sir *Iſaac Newton* * has obſerved, that there is a peculiar *Affinity*, and *Attraction* between Heat, or the Rays of Light, and *oleaginous*, and ſulphureous Bodies. 5thly, This Attrition is performed in Veſſels where no other *Medium*, ſuch as the Air (or at leaſt only its more ſubtle Parts) can intervene; for any warm Body placed in a *Vacuum*, retains its Heat much longer, than if expoſed to open Air, (its *Medium* being much more fine than common Air) and if a perfect Vacuum could be obtained, it is probable, that a *denſe* Body, ſufficiently heated, would perpetually *retain* its Heat. This perhaps may be the Cauſe of the perpetual Heat of the *Sun*, which, according to the beſt Computations, is the largeſt, and moſt denſe Body, of a *Form*, almoſt *ſpherical*, violently warmed, and agitated, and placed in a *Medium*, which muſt from thence be moſt ſubtle, and fine.

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* *Optics, P.* 250.

The bright purple *Colour* of the Blood, is chiefly owing to the *Lungs*, but not by admitting *nitrous Particles* with the *Air*, as *Lower*, and others have imagined; for it does not appear, that the common, groſs Air is received into the *Blood*, or that *Nitre* can be any Way ſufficiently *volatiliſed*, to be univerſally mixed with the *Air*, and fit for this Purpoſe; for all *Nitre* is naturally a *fixed Salt*, neither by the Mixture of a *volatile, alkaline Salt*, (if it ſhould happen to meet with any ſuch in the Earth, or Air,) can it be rendered *volatile*; for from thence it only becomes *ſemivolatile*, and incapable of aſcending ſo high above the Surface of the Earth, as is generally ſuppoſed; the *volatile Spirit* of *Nitre* is likewiſe an artificial Preparation, and one of the ſtrongeſt Acids, and would be moſt pernicious to the *Lungs*, if received into them: Neither does this Opinion receive any Force from the florid Colour, which the Blood acquires by being mixed with *Nitre*; for *Salt-Armoniac*, *Salt-Gem*, or common *Sea-Salt*, will give the ſame Tincture to it. But it is evident from the Diſcoveries which have been made with *Microſcopes*, that this Colour of the Blood is owing to the Action of the Veſſels on the contained Humours; for *Leuwenhoeck* * has given occular Demonſtration, that ſix *pellucid Globules* of *Serum*, compacted, and joined together, form a *red Globule*, whoſe Colour is loſt whenever they are ſeparated, and cannot be again reſtored by being mixed with *Nitre*, or any of thoſe *Salts*: And as the Preſſure of the Veſſels in the *Lungs* is greater on the circulating Fluids, than in any other Part of the Body, the Globules that were before ſeparated, or imperfectly joined together, are thereby compreſſed, and moſt exactly united; and from thence the Colour of the Blood, returning into the left *Ventricle,* is much more bright, and florid, than in the *right Ventricle,* before it received the Action of the *Lungs.*

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* *Tom* II. *P*. 3.

WHATEVER is the different Nature of the Food received into the *Stomach,* the *Chyle,* or *Milk* made from thence, is always of a *white* Colour; and when more perfectly elaborated by the Action of the *Veſſels,* and the Mixture of the other *animal Fluids,* is changed into a *red* Colour. This particular Alteration may in ſome Meaſure be illuſtrated from chymical Experiments made on *Milk*; for if this is mixed with any Thing of an *alkaline* Nature, and gradually agitated with a ſufficient Degree of Heat, it aſſumes a yellow Colour, and from thence paſſes thro' various Degree, till at length it becomes intenſely *red*; and if the Heat be farther increaſed, it is changed into a *dark* Colour. Thus in a human Body the *Chyle*, and *Milk*, by being mixed with the other animal Fluids, which are of an *alkaleſcent* Nature, though not *alkaline*; and by being prepared by more juſt Degrees of *Heat*, and *Preſſure*, are changed into a *yellow Serum*, and at length into *florid Blood*: On this Account, a *ſanguine* Complexion is almoſt peculiar to ſuch who uſe much Exerciſe; while they who lead an inactive Life, generally look *pale*; and in hot Countries, the Complexion of the Inhabitants becomes more *dark*, and aduſt, their Solids being parched, and their Fluids agitated with a ſtronger Force of Heat, than in a more moderate Climate.

The Opinion of the Air being received into the Blood, has very much prevailed, notwithſtanding there are ſeveral Arguments, which ſeems ſufficient to prove the contrary: 1ſt. The external Membrane that receives the immediate Contact of the Air, is lubricated with a mucilaginous, unctuous Humour; and ſuch as Mr. *Boyle* has demonſtrated, with the greateſt Difficulty, admits the Air to paſs through it *, and Water, which ſeems to be a more ſubtle Body, will enter through Pores, which are impervious to Air. 2dly, Every Part of the *Lungs* ſeems to be carefully guarded againſt its Admittance; for it cannot enter through the Arteries, becauſe the repreſſing Force of the circulating Fluid in theſe *Veſſels*, is greater than the preſſing Force of the Air; for no Fluid (as the Doctrine of *Hydraulicks* demonſtrates) can enter a

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* *Lib.* II. *Chap.* 13.

Veſſel repleniſhed with another Fluid, where the Reſiſtance of the one is greater than the Preſſure of the other; and the Veins, which lie on the external Coat, are ſo compreſſed by every Inſpiration, that no Admittance can be then expected of another *Fluid*, and in Expiration, the preſſing Force of the Air is directed a contrary Way: Beſides, if the Air could obtain a Paſſage into the Veins, it muſt enter through every Veſicle, ſince one has not a more particular Privilege of admitting it than another; but as the Number of theſe is almoſt infinite, it muſt unavoidably follow, that in the *Sinus Lowerianus*, where they all terminate, there muſt be a very conſiderable Collection of Air, and being there agitated with the Blood, Bubbles muſt be thence excited; but nothing of this Nature can be obſerved with the beſt Microſcopes *. 3dly, If Air be injected into the Veſſels of any *Animal,* it ſoon proves fatal: It ſeems therefore improbable, that the common, *groſs* Air can be admitted into the Blood through the Lungs, (though 'tis beyond Doubt, that ſome of the finer Parts enter with the Chyle into the Lacteals) and the Advantage which *Borellus* * aſſigns to the Blood, from the intermediate Poſition of the Particles of *Air* between the Globules of Blood, producing an *oſcillatory, elaſtic* Motion, may be more juſtly explained from the Particles of Fire, which penetrate, and enter all Bodies, both ſolid, and fluid, which are thereby rarified in Proportion to the Quantity of Heat, and the different Denſities of ſuch Bodies; and as it can be demonſtrated, that the Force of Heat is ſcarce the ſame in any Part of Matter for two ſucceſſive Moments of Time, it evidently follows, that not only in the Blood, but in all other Solids, and Fluids there muſt be a *perpetual, oſcillatory, periſtaltic* Motion.

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* *Leuwen. Op. Tom* II. *P.* 37. 214.

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* *De Motu Animalium, Pars* II. *Prop.* 115.

CHAP.

CHAP. IX.

Of the Diſeaſes of the Lungs.

AS the Lungs are the *principal Organ* of the *ſecond Digeſtion*, and as the *third* Digeſtion, and the moſt material Functions of the animal Oeconomy muſt be deficient, in Proportion as they are affected, I ſhall endeavour more particularly to deſcribe the Diſeaſes incident to them, eſpecially of the *chronic* Kind, and the Method of curing them, or of preventing their Progreſs.

From their tender Structure they are not only apt to be affected by light

Cauſes; but to be ſoon deſtroyed by a Continuation of them. Theſe in their firſt Stage, and in their Progreſs, may more eaſily be removed; but when they terminate in a *Suppuration*, or *Phthiſis*, with great Difficulty admit of any Cure.

SEVERAL Diſeaſes, which proceed from the ſame Cauſes, differ only in their Situation; and the moſt certain Method of attaining a Knowledge of *internal* Diſorders, is by comparing them with ſuch as are *external*, and of the ſame Kind; therefore the obſcure Origin of *internal* Suppurations in the Lungs, may be more evidently explained from the ſenſible Cauſes of ſuch as are *external*; all which may be reduced to whatever Cauſe *obſtructs*, *inflames*, and then *ſuppurates* the Veſſels, or *diſſolves* their *Continuity*, of which a Suppuration is the unavoidable Conſequence: In this laſt Caſe, a Suppuration is formed, without any *preced-*

ing Obſtruction; in the former it is the *Conſequence* of it: But though the ſame Effect is produced from different Cauſes, the Indications of Cure, in the firſt Stage of this Diſtemper, are very different; and even in the laſt Stage, though the Symptoms are in many Reſpects the ſame, a particular Regard is to be given to the firſt Cauſe, which has laid the Foundation of this Diſtemper.

Hence it is evident, that the beſt Method of explaining the Diſeaſes of the Lungs, in their Origin, and Progreſs, is to conſider them as ariſing from ſuch *Cauſes* as diſpoſe the Veſſels, and Humours to form *Orſtructions*, and particularly determine them to the Lungs, and from whatever Cauſe gives the Blood ſuch a Force, and Acrimony, and their Veſſels ſuch a Weakneſs, as muſt if increaſed, *diſſolve* their *Continuity*, the ſame Cauſes produce the ſame Effects in the Veſſels of the Lungs, and in theſe on the Surface of the Body, for the Sharpneſs of an Inſtrument, and the Force given to it, which produce an external Wound, are exactly ſupplied in an internal Hæmoptoe, by too great a Force given to *acrimonious Fluids.*

As theſe Cauſes are various, and ſometimes very different, they muſt, when ſeparated, or blended together, form different Diſeaſes, both *acute,* and *chronic,* which in their Progreſs may terminate in a Suppuration of the *Lungs.* *Hippocrates* very particularly deſcribes ſeveral Species of them, but chiefly of the acute Kind, terminating in a *Phthiſis*; where the Symptoms, their Progreſs, and Method of Cure, are very different; but in the general he deduces all Suppurations from *Bile,* or *Phlegm* falling, or lodged on the Lungs, or from a Wound or Rupture of their Veſſels *: Theſe *internal* Cauſes, he likewiſe obſerves, are often increaſed, and determined to theſe Parts by the Air, and *external* Accidents: This general Diviſion bears ſome Analogy to what I have laid down, as the ſame Changes are produced in obſtructed Veſſels, by an increaſed, or diminiſhed Motion in the circulating Fluids, which he aſcribes to theſe Principles acting on Humours ſtagnating, or extravaſated.

From a Neglect of obſerving this regular Method, moſt Authors differ in their Opinion about the Nature of theſe Diſeaſes, and the Method of Cure; but this Difference may from hence be explained, for what is uſeful in one Species, or Stage of them, may eaſily prove deſtructive in another.

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* *De Morbis, Lib.* I.

SECT. I.

Of a Catarrh, and Fluxions on the Lungs.

OBSTRUCTIONS in the Veſſels, and Glands of the Lungs are formed from different Cauſes; but as a *principal Species* of them is originally *owing* to a previous *ſerous Plenitude*, and a *Fluxion* of vitiated Humours on them, I ſhall firſt endeavour to explain the Origin, and Progreſs of ſuch Fluxions, by which Means the particular Nature of the *Obſtructions* thence formed, and the Method of Cure will become more evident.

THIS Method will appear more neceſſary, as the beginning Obſtructions, which are formed while Catarrhs, and Fluxions are determined to the Lungs, require a Method of Cure, very *different* from that, which is to be purſued in thoſe more *fixed,* and conſtant Obſtructions, which frequently ſucceed them, and produce *habitual* Coughs; and hence ariſes the great Difficulty of removing theſe Obſtructions, as ſuch Perſons are not only liable to frequent Returns of large Fluxions, but are ſeldom free from ſome Degree of them: On which Account, their diſtinct Nature muſt be well known, before a proper Regimen can be directed, how to treat them when ſeparated, or blended together.

WHILE the Humours are preſerved in a juſt Degree of Heat, and Motion, they continue perfectly fluid; but in the ſame Proportion, in which they deviate from this healthy Standard, they degenerate into a more unequal Mixture, a larger Separation of viſcid, ſerous Parts, and become more apt to form Obſtructions.

Persons thus pre-diſpoſed by a relaxed Conſtitution of Fibres, an improper Diet, an inactive Life, and particularly by weak Lungs, will be more liable to Obſtructions in the Veſſels of them, when a moiſt, cold Air, by diminiſhing Perſpiration, brings on a greater Plenitude: Hence Coughs are generally obſerved to prevail moſt in ſuch a Seaſon, and immediately after long Froſts, when the Thaw begins; for then the *Gravity* of the Air being greatly diminiſhed, the Humours circulating through the Lungs, acquire a greater *Lentor* from the Want of a ſufficient Preſſure to *attenuate* them, which is increaſed by the *Coldneſs*, and *Moiſture* of the Seaſon, and that univerſal *Relaxation* of the Veſſels, which the ſame Diſpoſition of the Air brings on. In this State, *Perſpiration*, and the finer Secretions, will be obſtructed, and diminiſhed, and a *general*, or *partial Plenitude* ſucceed, which will irritate the di-

diſtended Veſſels to a Diſcharge, and always determine it to ſuch Parts, as are moſt weak, and give the leaſt Reſiſtance.

FLUXIONS, from theſe Cauſes, will ſometimes ſoon, and *directly* affect the Veſſels, and Glands of the Lungs, eſpecially if they are weak, and have been relaxed by habitual Coughs; but in their common Courſe, this ſerous Plenitude is generally firſt determined to the Veſſels of the *Brain*; perhaps from their yielding, and more tender Structure: On which Account, *Hippocrates* *, and indeed all the Antients, not without Reaſon, ſuppoſed the *Head* the principal Seat of all Fluxions, from whence *Defluxions* on the depending Parts, and particularly on the Lungs, more ſlowly take their Origin.

LOWER † endeavours to refute this Opinion, and very juſtly proves, that there is no immediate, or pervious Paſſage from the Brain to theſe Parts, to admit of ſuch Defluxions, or Diſtillations; and that all the returning Blood, and Humours from thence, are received into the jugular Veins: However, tho' *Hippocrates* has erred in his anatomical Account, and Manner of explaining theſe Fluxions, yet his Obſervation that the Head is principally firſt affected by them, is certainly juſt; and it is evident, that the ſucceeding Defluxions will generally be the natural Conſequence of this previous ſerous Plenitude in the Veſſels of the Brain, which muſt then give a greater *Reſiſtance* to the Blood moving in the carotid Arteries; by which Means their *external Ramifications,* which are diſperſed over the *glandular Membrane,* inveſting the Noſtrils, Palate, Trachæa Arteria, and all the Muſcles peculiar to theſe Parts, will be gradually more loaded, and obſtructed, and the Secretions from their relaxed Veſſels, and Glands increaſed.

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* *De Locis in Homine, Sect.* IV. *et de Glandulis.*

† *De Catarrhis.*

On this Account, Catarrhs are uſually preceded by a general Laſſitude, a Weight, and Heavineſs in the Head, diſturbed Sleep and Dreams, an Inflation in the Face, rheumy, and watry Eyes, ſucceeded by frequent ſneezing, and a copious Excretion of thin, ſalival Humours, and ſometimes with a Difficulty in ſwallowing, a Heavineſs, and a frequent irritating Cough; and when the Lungs begin to be affected, a Weight in the Breaſt ſucceeds, which often becomes painful, with a more deep, and violent Cough, an increaſing Heat, and Fever, and a difficult Expectoration of a thin, frothy Phlegm.

The Humours lodged in theſe different Parts, gradually become more *digeſted*, when aſſiſted by a juſt Degree of Heat, and Fever; which likewiſe contributes to leſſen the Fluxion, by enlarging the Blood's Motion, and reſtoring the obſtructed Perſpiration; the Expectoration becomes more free, and eaſy, and if that is *compleat*, and the *diſtended* Parts recover their uſual *Tone*, all the Symptoms ceaſe.

THIS is the uſual Progreſs of Catarrhs, originally owing to a *Diminution* of *Perſpiration*, and an increaſing *ſerous Plenitude*; and are therefore to be conſidered as *critical* Diſcharges, and natural Efforts, which often want to be moderated, but are not without Danger ſuddenly ſuppreſſed: On which Account, a Defect of a ſufficient Diſcharge from the Glands of the Mouth and Noſtrils, will be apt to affect thoſe placed in the ſuperior Part of the *Trachæa*; an habitual Cough, and a Diſcharge from theſe Glands, has often preſerved the Lungs from being affected; and a Suppreſſion, or ſudden Diſappearance of it, is generally ſucceeded by a fatal Phthiſis.

HENCE may be explained the Nature of *irregular* Fluxions, and Suffuſions, which are always more apt to return in ſuch Changes of the Air, and at ſuch Seaſons in which Perſpiration is moſt diminiſhed; and why others are more *periodical* in their Return in the different Changes of the *Moon*, and particularly once a *Month?* at which Time *Sanctorius* has obſerved, that there is conſtantly an increaſed Weight, and Plenitude, even in healthy Men, who uſe a temperate Regimen, and is uſually carried off by an increaſed Quantity of *turbid Urine*; which Diſcharge, he obſerves, is as neceſſary to them, as that of a periodical Kind is to Women; ſuch therefore who have weak, and relaxed Lungs, will be then more particularly liable to Fluxions on them; and how far ſuch Conſtitutions may be affected by the *Preſſure* of the *Air* being more diminiſhed at the different *Periods* of the *Moon,* the learned Dr. *Meade* *, has fully explained.

As Fluxions of this Kind are originally owing to a Diminution of Perſpiration, and an increaſing ſerous Plenitude, the evident Indication is to reſtore that Diſcharge, and to prevent the Fluxion of ſuch Humours.

But this *principal* Intention cannot be ſafely, or effectually purſued, but when the uſual Weight of the Body *begins* firſt to increaſe, which cannot be exactly known but by ſtatic Obſervations, tho' it is generally preceded by a *Laſſitude,* and *Coldneſs* in the extreme Parts.

In theſe Circumſtances, *Abſtinence* is the firſt and principal Rule for two, or three Days, at leaſt from *Quantities* of any Kind; what Diet is then taken ought to be light, and moderately generous, and the Body to be kept warm: Frictions are particularly ſerviceable, eſpecially if ſucceeded by the Uſe of warm Bathing, warm Wine, and light Diaphoretics, which produce a *ſenſible* Perſpiration.

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* *De Imperio Solis et Lunæ.*

BEGINNING Fluxions, by ſuch a Regimen, may be either *prevented*, or their Force much *moderated*; but they generally make ſuch an inſenſible and ſlow Progreſs, or are ſo quickly determined to the Lungs, that their Direction is *fixed*, before it can be uſed.

WHEN this ſerous Plenitude is *determined* on theſe Parts, it will in its uſual, and regular Courſe, be gradually *digeſted*, and *diſcharged*, when aſſiſted by a proper Degree of Heat, and a ſuitable Regimen. But when theſe Fluxions are acrid, and violent, and engage the Veſſels of the Lungs, attended with a Fever, and Heat too much increaſed, Bleeding, and repeated, gentle Purgatives, large diluting, with the Uſe of mild, attenuating Medicines, and the ſofter Pectorals, will be neceſſary to *moderate* their Progreſs, and prevent an *Inflammation*, and a *Suppuration*, which is the eaſy Conſequence of it, eſpecially in weak, or previouſly obſtructed Lungs.

THIS Regimen is therefore only neceſſary to prevent the Effects, and not remove the original Cauſe of ſuch Catarrhs, and muſt unavoidably leave the Body more languid, and ſuſceptible of *new Fluxions*, and leſs capable of *digeſting*, and diſcharging the remaining, obſtructed Humours: On which Account, Evacuations, eſpecially by Bleeding, muſt be uſed with Caution, and ſuited to the Strength of the Conſtitution, and the Degree of the Fluxion; and it is obſervable, that in theſe Caſes the Pulſe, though quick, generally is ſoft, and tho' the Blood ſhews a *ſuperficial, inflammatory* Appearance, yet the other Parts of it are rather *looſe*, and *diſſolved.*

No Medicines more effectually contribute to moderate the Progreſs of ſuch Catarrhs, than *ſaline Purgatives*, eſpecially *Sal-Polychreſt*, diſſolved in warm Water, or in that of *Scarborough*, as it mildly determines the ſerous Plenitude, to the Glands of the Inteſtines, and powerfully corrects, and attenuates any inflammatory Viſcidity in the Humours: *Manna*, or the *Electrium e Caſia*, may be ſometimes convenient, which, as *Sanctorius* juſtly obſerves, leſs diminiſh Perſpiration than Purgatives of any other Kind.

DURING this Regimen *Diaphoretic* Medicines, and ſometimes *Sudorifics*, will be neceſſary to diſengage the obſtructed Veſſels on the Surface of the Body, and to re-

reſtore Perſpiration; for while that is deficient, new Fluxions will perpetually ſucceed.

If ſuch Fluxions are not attended with inflammatory Symptoms, but are of a more ſlow Nature, *aloetic*, or the warmer ſaline Purgatives, ſuch as the *Sal-Glauberi*, or *Sea-Water*, will be neceſſary, with a more active diaphoretic, or ſudorific Regimen.

But Sudorifics cannot be ſafely uſed, but after previous Evacuations, and are chiefly neceſſary to enlarge the Blood's Motion, and to diſengage more *fixed* Obſtructions, formed in the ſmall, diſtant, perſpiring Tubes.

Evacuations therefore by Bleeding, and Purging, may make the Progreſs of a Catarrh more ſafe; but will retard the Digeſtion of the Phlegm collected in the Glands, and make the Expectoration more tedious, and difficult, increaſe their Relaxation, and make them more liable to returning Fluxions, and more chronic Obſtructions; whereas 'tis obſervable, that after a more warm Regimen, a juſt Degree of Fever, and a Diſcharge by ſenſible Perſpiration, the Quantity of Phlegm ſeparated, and collected, becomes leſs, more digeſted, and more eaſily expectorated.

ON this Account, ſeveral practical Rules given by *Hippocrates*, are to be conſidered only with Regard to this *Species* of pulmonary Diſorders, and are directed with a principal View of giving a due *Concoction* to the ſtagnating Humours, and in promoting an *Expectoration* of them, which will then eaſily ſucceed; and hence may be explained ſeveral Paſſages in his Writings, which muſt otherwiſe appear obſcure, and abſurd. Where he often uſes the Word *Suppuration*,

tion, or *Pus*, as a ſynonimous Term to expreſs a *ſimple Concoction* of Humours, and genererally of the *pituitous Kind*; but in a Senſe very different from what he means in other Places by a real *Suppuration*, ſuch as is formed in an Abſceſs, or Ulcer: Thus when he ſays*, That *ſuch who form Pus inwardly, do not die, but recover*; and this he limits ſometimes to within fourteen Days; he then evidently deſcribes that *Concoction* of pituitous Humours, which is the *Solution* of the Diſeaſe; whereas an internal, true Suppuration is the *beginning* of one, always attended with Danger, and often fatal; and this Diſtinction he ſeems clearly to explain † when he ſays, that the expectorated Matter is *concocted*, when it appears *like Pus*. In ſeveral of his Prognoſtics on this Head, he always conſiders this previous *Concoction* as neceſſary to a free *Expectoration*, and to prevent a *true Sup-*

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* *De Locis in Hom.* † *De Victûs Ratione.*

puration, which muſt follow when that is deficient; for in ſuch Caſes, he adds, *the Lungs become purulent*; the former Concoction terminates in Health, and this in a progreſſive *Tabes*.

FREQUENT, ſlow, returning Fluxions, in a flaccid, cold Conſtitution, can only be effectually cured by a generous Diet, chiefly of the ſolid Kind, and by ſuch Medicines as prevent a Plenitude, and promote Perſpiration: On which Account, they are generally leſs immediately dangerous, than large Fluxions, but more obſtinate.

FLUXIONS that flow directly on the Lungs, are more violent, and dangerous, than ſuch as firſt engaged the Head, and the Glands of the Noſtrils, Mouth, and ſuperor Parts of the Trachæa, as they are then generally attended with previous *Obſtructions*, and *Weakneſs* in the *pulmonary*

Veſſels, and as the ſerous Plenitude has not been waſted by any other Diſcharge.

ANOTHER Species of a Fluxion on the Lungs, ariſes from a State of the Fluids, very different from the former, when they have acquired an *inflammatory Tenacity*: This is always owing to a *Heat* greater than is uſual to them, or to any Cauſe which diſſipates the finer, and leaves the more groſs Parts behind; ſuch as hard Exerciſe, drinking Spirituous Liquors, or profuſe Sweats.

PERSONS thus pre-diſpoſed, will be more liable to a *direct*, and *acute* Fluxion, when any external Cauſe concurs to increaſe the Quantity of Humours, and to determine them to the Lungs; ſuch as *froſty* Weather quickly *ſucceeding* a more *warm* Seaſon, or continued *North* Winds, which, by diminiſhing *Perſpiration*, and giving too ſudden a *Contraction* to the *pulmonary*

monary Veſſels, not only gives them a Diſpoſition to Obſtructions, but to *retain* them more: On which Account, *Hippocrates*[*] has obſerved, that *painful, glandular Inflammations* in the *Throat,* and *Coughs,* prevail moſt in ſuch Seaſons; eſpecially among thoſe who have contracted, or irritable Fibres; whereas *Catarrhs,* and more *cold Fluxions* are chiefly epidemic in a *moiſt* Seaſon, and when *South* Winds blow, and particularly among Perſons of a *relaxed* Habit of Body.

DIFFERENT Species of *pleuritic,* and *peripneumonic* Diſeaſes, ariſe from *acute* Fluxions of this Kind, which are more, or leſs violent, according to the Degree of Inflammation, and Seat of the Diſorder. It is not my Intention in this Treatiſe to enter into a particular Deſcription of ſuch Diſeaſes, or even to ſketch out the Method of Cure; but it is ſufficient to obſerve, that if they are not cured by a proper Regimen, they generally terminate either in Death, or in a *Suppuration*: Inflammatory Diſeaſes therefore of this Kind, are to be conſidered as the frequent *original* Cauſe of a true *Phthiſis*, into which they terminate, ſometimes with a quick, and rapid Progreſs; but at other Times, when they have been *imperfectly cured*, and ſome of the Veſſels of the Lungs *continue obſtructed*, though ſound, and often in a more compreſſed State, from a remaining Adheſion to the Pleura, they give Riſe to a *particular Species* of *Obſtructions*, and an *habitual* Cough; which, if not prevented, is apt more ſlowly to terminate in a Phthiſis. *Hippocrates* * deſcribes a great Variety of *pleuritic*, and *pulmonic* Diſeaſes, which terminate ſoon in a *Suppuration*, and a *Phthiſis*; but does not mark out clearly in any Place that *intermediate,* and more *chronic* State of Obſtructions, and Diſpoſition to a Suppuration, from ſuch previous, acute Diſeaſes; though he ſeems in ſome Places to make a Diſtinction, where he deſcribes ſome which have laſted a Year, before they terminated in a fatal Phthiſis, ſome ſeveral Years, and others to old Age.

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[*] *De Humoribus.* S. II. *Lib. Aphor.* S. III.

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* *Lib. de Morb. et Affect.*

SECT. II.

Of an Aſthma.

AN *Aſthma* is a particular Species of a Fluxion on the Lungs, attended with a *ſpaſmodic* Contraction of their Veſſels, and particularly of the *meſochondrion Muſcles*, and their decreaſing circular Rings: From this increaſed Reſiſtance, the *Inſpiration* becomes more difficult, and Reſpiration more frequent.

AN Aſthma is ſometimes ſimply ſpaſmodic, and ceaſes without any ſucceeding Expectoration. I knew a Lady who was ſubject to violent Paroxyſms of this Kind; but was always free from them while ſhe was pregnant: In the former State, the *Catemania* flowed too largely, and weakened the nervous Syſtem; in the latter ſhe enjoyed more Health, and a greater Freedom of Spirits: But aſthmatic Paroxyſms are generally attended likewiſe with a *humoral* Fluxion, and terminate in an Expectoration of *concocted* Matter before they entirely ceaſe.

THE ſame Indications are to be purſued in theſe, as in the former Fluxions on the Lungs, particular Regard being had to the irritable, and ſpaſmodic State of the Nerves: They require often to be moderated, but not too much ſuppreſſed; for the Paroxyſm is a natural Effort to diſengage the Nerves, and the Veſſels, and Glands of the Lungs; but as it is generally more violent than in common pituitous Fluxions, will more frequently require Bleeding.

EMETICS given before the expected Paroxyſm, will often prevent, or moderate the Fluxion, and towards the End promote a quicker Expectoration; but in the firſt Stage, and during its Violence, are generally prejudicial: Volatile Spirits diluted in aqueous Liquors, and a Solution of the nervous Gums, are moſt effectual in removing the ſpaſmodic Contraction of the Veſſels.

The Regimen neceſſary *radically* to cure, or prevent the frequent Return of an Aſthma, muſt be therefore very different from what is required during the Paroxyſm; where the Effort, though neceſſary, is generally too violent, and apt to bring on inflammatory Symptoms; it muſt, however, act in Imitation of it, by giving an increaſed Motion to the Blood, but in a more uniform, and conſtant Manner, and in ſtrengthning the nervous Syſtem; by which Means Perſpiration, and the Circulation through the fineſt Veſſels of the Lungs, may become more free: Medicines of the warm, and attenuating Kind, ſuch as *Gum Gu-*

aicum, Aſa fœtid. Cinnabar. Antimon. Moſchus Oriental. a ſtrong Expreſſion of the *Millepedæ*, Preparations of the *Cortex Peruvian.* large Exerciſe, particularly a Sea-Voyage, and a light, generous Diet, are moſt uſeful to theſe Purpoſes.

BUT frequent Returns of an Aſthma, even of the ſpaſmodic Kind, will at length produce ſuch a *Relaxation* of the bronchial Glands, and Adheſions of the Lungs to the Pleura, as will render it *incurable*; and where the Veſſels are ſtrong, and the Paroxyſms regular, and moderate, they ſometimes become uſeful, by diſengaging the nervous Syſtem, and diſcharging ſuch Humours as would otherwiſe become noxious to them. Thus an *habitual* Diſeaſe, under a proper Conduct, may be ſometimes the beſt Defence againſt others more dangerous, of which the following is a particular Inſtance;

A VERY learned Prelate was for ſeveral Years ſubject to frequent Returns of an Aſthma; but by a low, and abſtemious Manner of Life, the Paroxyſms became more moderate, and leſs frequent, and at length entirely diſappeared: He continued free from them near the Space of a Year, without any remarkable Complaint; but in the ſucceeding Summer, 1751, while he was walking in his Garden, he fell down in a Fit of the epileptic Kind; this was ſucceeded by ſeveral orhers: In this Condition he came to Town in the following Month of *October*; the Fits were then frequent, ſeldom leſs than four in a Week; he was entirely deprived of all Senſe while they continued, the Spaſms were weak, his Pulſe very low and quick, and before the Approach of the Fit ſcarce to be perceived.

I DIRECTED a Diet of the ſolid Kind, and moderately ſeaſoned; his Drink was chiefly *French* Claret, the Quantity of which was by Degrees increaſed to a Pint and a half in a Day, and ſometimes exceeded it, when his Spirits were low; as he was not thirſty, he ſeldom drank Water with it, or any other diluting Liquor: He conſtantly took a Vomit of a ſtrong Infuſion of Horſe-Radiſh Roots in Water, twice in a Week, and repeated it whenener he perceived a Giddineſs in his Head, a great Oppreſſion, or Flatulency in his Stomach, which were the Symptoms that uſually preceded the Fit. His Body was kept regular by the occaſional Uſe of *Pil Ruſi*: In the Beginning he took various nervous Medicines, which did not produce any remarkable good Effect; and afterwards he only took, going to reſt, two or three Pills of the pure *Aſa fœtida.*

By this Regimen the Fits became by ſlow Degrees leſs frequent, and more moderate, he often had no Return in a

Month, ſometimes in ſix Weeks, but ſeldom exceeded two Months, neither did he always loſe his Senſes, or fall down, but had his Eyes fixed like one *cataleptic*, with weak Spaſms only in the Muſcles of his Face; his Health and Strength were rather improved, than impaired.

THIS was the general Progreſs of this epileptic Diſeaſe, until the Month of *June* 1756, which from that Time has not retnrned: In the preceding Spring he was ſometimes lightly *aſthmatic*, and had ſince ſeveral regular Paroxyſms, but leſs frequent, and more mild than formerly. I ſaw his Lordſhip in the Month of *Auguſt* laſt, he had then been free from any Return of the epileptic Fits a Year and ten Months; and I have lately heard, that he continues in the ſame State in which I left him, and enjoys as much Health as can be expected at his Time of Life, which is now advanced to ſeventy Years.

SECT. III.

Of Obſtructions in the Lungs.

I HAVE in the former Section given an Account of the Origin, and Progreſs of Catarrhs, and Defluxions on the Lungs: Theſe, when violent, and attended with an Inflammation, may by Neglect, or Miſmanagement, ſoon terminate in a Suppuration, and Phthiſis; but more frequently leave the Veſſels, and Glands of the Lungs *obſtructed,* though ſound: Obſtructions of this Kind, when *fixed,* are attended with an *habitual* Cough, and may be juſtly conſidered as the *firſt Stage* of a Phthiſis, as they are apt more ſlowly to terminate in a *Suppuration,* and require a Regimen very different from that which was neceſſary during the Fluxions on the Lungs: But before I proceed on this Subject, I ſhall mention what other Cauſes likewiſe contribute to form Obſtructions in the Lungs; as each Species will in ſome Reſpects require a different Method of Cure.

The Humours, though in a proper Degree of Fluidity, may be diſpoſed to form Obſtructions, by the Mixture of *crude, indigeſted Chyle,* when the Organs of the firſt Digeſtion are impaired, and not capable of changing the Aliment into laudable Chyle, or when from a peculiar Weakneſs in the Organs of the ſecond Digeſtion, it is not ſufficiently attenuated, and elaborated into Serum, but retains a *chylous Viſcidity.*

The Effects of this unprepared Chyle, will be firſt perceived in the *pulmonary* Veſſels, where it is quickly conveyed almoſt unchanged, and will be more apt to form Obſtructions than any other circultaing Humours, which are more attenuated, and fit for Motion, by having circulated through the fineſt Extremities of the Arteries; whereas the new Chyle, when firſt received into the pulmonary Arteries, is more unfit for paſſing through them, and more diſpoſed to form Obſtructions, eſpecially when it retains a greater Viſcidity than uſual.

THIS Indigeſtion is a frequent Cauſe of *beginning Obſtructions* in the *pulmonary* Arteries: Theſe are always attended with a *dry* Cough, and Fluxions on the bronchial Veſſels, and Glands, with a *pituitous* Expectoration.

THE Lungs may be likewiſe diſpoſed to form Obſtructions, by whatever renders their Capacity *too narrow.* This may ariſe from various Cauſes, ſuch as an *irregular Motion* of *animal Spirits,* or too *fixed* an *Attention* of the *Mind*; any *internal Acrimony,* which ſtimulates the

Veſſels to ſtronger *Contractions*, eſpecially if they are tender, and eaſily affected; or from any *external* Cauſe *irritating*, or *compreſſing* the Lungs; ſuch as *cold Damps*, *arſenical*, or *mercurial* Steams, and particularly an original *bad Formation* of the *Thorax*, confining and preventing the free Motion, and Expanſion of the Lungs, which muſt unavoidably at length be attended with *Adheſions* to the *Pleura*, and an *increaſed Preſſure* on them.

Hence it appears, that ſeveral previous, *acute*, and *chronic* Diſorders, by either giving an *inflammatory*, or *languid Viſcidity* to the Fluids, or by affecting the *Solids*, may contribute to produce *beginning Obſtructions* in the *Lungs*; and hence may be eaſily underſtood the true Nature of that Conſumption, which is called *ſymptomatical*.

Hence likewiſe it is evident, that different Extremes in the Air, as being either

ther too moiſt, or too dry, too hot, or too cold, its Gravity too much increaſed, or diminiſhed, will, by rendering the Veſſels too much contracted, or by diſpoſing the Humours to become viſcid, greatly contribute in Conſtitutions variouſly pre-diſpoſed to bring on, and particularly determine theſe Obſtructions to the Lungs.

SEVERAL Authors are of an Opinion, that a *Conſumption* of the *Lungs* is *contagious*; but have not rightly conſidered in what particular Caſes only, and after what Manner it may prove ſo; for it cannot be communicated, but from one in the *laſt Stage* of a Phthiſis; neither then is the Contagion ſo ſudden as in other Diſeaſes; but requires a longer Time to exert its Malignity, and generally a peculiar Pre-diſpoſition in the Perſon who receives it: But when theſe Circumſtances concur with ſufficient

Force, it is moſt certain, from many Inſtances, that the Infection may be communicated; neither is the Reaſon of it very obſcure, for by frequently lying in the ſame Bed with one in the laſt Stage of that Diſtemper, and particularly by cloſely inhaling their Breath, the Lungs may at length be eaſily tainted; for it is very evident from repeated Experiments, that the abſorbent Veſſels are capable of conveying a conſiderable Quantity of Humours into the Blood, eſpecially when Sleep, and the Warmth of the Bed, by increaſing their Relaxation, gives them a greater Aptitude to receive them, at the ſame Time in which the phthiſical Perſon commonly diſcharges by *Sweat*, the greateſt Quantity of the moſt *noxious*, and *acrid* Humours; and ſome remarkable Caſes have been known, where the *Steams* ariſing from *malignant Ulcers*, or *Cancers*, and immediately inſpired into the Lungs of another, have in the ſame Manner as *arſenical Effluvia* irritated, obſtructed, and eroded their tender Veſſels.

The Symptoms, and Progreſs of Obſtructions formed in the Lungs, are varied according to the different Cauſes, Seat, and Duration of them.

The more complicate the Cauſes are, the greater is the Danger, and Violence of the Symptoms: Thus Obſtructions in the Lungs are frequently owing not only to a *relaxed* State of the Solids, and a *Lentor* in the Fluids, but likewiſe to an *indigeſted Chyle*; and a Defect in the latter, is apt to bring on a general Depravity of the Humours; but though they are mutually the Conſequences of each other, yet the *original* Cauſe is principally to be regarded, and may be eaſily diſtinguiſhed; as the Effects of Indigeſtion are immediately perceivable in the firſt Paſſages, but of a Viſcidity of the Fluids in the more re-

remote Scenes of Action: Obſtructions ariſing from an *inflammatory* State of the Blood, are attended with a greater Degree of Fever, and Pain, and make a more rapid, and dangerous Progreſs, than ſuch which proceed from a more *languid* Viſcidity: When this Diſpoſition in the Fluids is attended with an *eroding Acrimony*, or the Veſſels from any internal Cauſe, or an original bad Formation, are more *weak*, and compreſſed, the Danger will in Proportion to theſe Circumſtances be increaſed. Thus Perſons of a weak Conſtitution, who lead a ſedentary, and ſtudious Life, have not only a Diſpoſition to form Obſtructions in the Lungs, from an imperfect *Indigeſtion* of the *Chyle*; but the other Fluids from the ſame Inactivity are apt to acquire a *Lentor*, and their Veſſels likewiſe are ſometimes liable to a peculiar *Contraction* from the fixed *Attention* of the *Mind*, or the *irritable State* of the *nervous Syſtem*: This is evident from the large Diſcharge of pale Urine, which frequently attends ſuch Perſons when their Spirits are ſuddenly, or diſagreeably affected, which ariſes from a general Contraction of the Nerves compreſſing the arterial Syſtem, and increaſing a Diſcharge from the Kidneys, which in that ſpaſmodic State can only ſeparate the finer, and moſt diluted Parts: On this Account, all nervous Spaſms are to be conſidered as natural Efforts to throw off ſome oppreſſing, or irritating Cauſe, and are always attended with a greater Secretion, and Action of animal Spirits, and an increaſed Motion of the Blood, but leave the Body afterwards more languid, and relaxed.

The Seat of theſe Obſtructions is either in the pulmonary, or bronchial Arteries: This Diſtinction is neceſſary not only to explain the Difference of the Symptoms, and their Progreſs, but to point out in ſome Caſes the different Method of Cure.

It is certain, that the extreme Ramifications of the pulmonary Artery, terminate in the bronchial Veſicles, and perpetually exhale their fineſt Fluids, while abſorbent Veins diſperſed there, are capable of receiving others from the Air: But the Secretion of the *glandular* Humour ſeems to proceed entirely from the bronchial Arteries, to which Purpoſe they are in many Reſpects more adapted, than the pulmonary Artery, where the rapid Motion of the Humours renders them leſs fit for ſuch ſlow, and regular Secretions.

Obstructions formed in the bronchial, are leſs dangerous, than in the pulmonary Arteries, and attended with milder, and different Symptoms, as the Blood moves with a more moderate Velocity through them, and as they terminate in Glands diſperſed through all the Ramifications of the Trachæa: On this

Account, Obſtructions formed in them are more eaſily diſengaged, and attended generally with a moiſt, pituitous Expectoration, which before its Diſcharge, is apt to produce a wheezing Noiſe; whereas Obſtructions formed in the pulmonary Arteries, as they have no Termination but into the pulmonary Veins, are in the Beginning always attended with a dry Cough, an uneaſy Reſpiration, but without wheezing, a more conſtant Oppreſſion, and an obtuſe Pain, which is more perceivable in full Inſpiration.

THE Seat of theſe Obſtructions, may be likewiſe more particularly known by the Force of the Cough, and Manner of Expectoration: Thus when the Glands placed about the Origin of the Trachæa are obſtructed, the uneaſy Irritation is firſt perceived in the Parts immediately affected, frequently attended with a violent Cough, and an acrid Defluxion;

but the Phlegm when concocted, is diſcharged with an hawking, or light Cough: When the Seat of theſe Obſtructions is in the Lungs, the Irritation is then perceived deeper, and the Expectoration is in Proportion to their diſtant Situation, more difficult; notwithſtanding in this Caſe the Glands in the ſuperior Parts of the Trachæa, will at length be abraded by frequent Coughing, and an uneaſy Irritation likewiſe produced in them; whence the Cough becomes more frequent, and violent, and in the ſame Manner a Cough excited only by a Defluxion from theſe Glands, by irritating, and agitating the Lungs, will be apt at length to produce deeper Obſtructions in them, and a more complicated Cough.

Obstructions formed in the pulmonary, or bronchial Arteries, receive a quick Increaſe from the ſame Cauſes which firſt produced them: *Leuwenhoeck** illuſtrates this Progreſs by the Obſervations he made on the bruiſed Wings of a Bat, and on the Tail of a Frog, where the viſcid Globules obſtructing the Extremities of the Arteries, if nót attenuated, and propelled into the Veins by the Force of the circulating Humours, received from them a conſtant Addition; for ſome of the more fluid Parts only ouzed thro', or entered, and diſtended the lateral Veſſels, while the more groſs remaining, not only added to the obſtructing Matter, but by preſſing on the adjacent Veſſels, diſpoſed them likewiſe to form new Obſtructions.

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* *Tom* II. *Epiſt.* 67. *P.* 205, 206. *Tom* III. *Epiſt.* 119.

HENCE Obſtructions in the bronchial, will be ſoon apt to produce Obſtructions in the pulmonary Arteries; for being equally ramified through the Subſtance of the Lungs, when the Veſſels of either are much obſtructed, and diſtended, by compreſſing the other, they will eaſily diſpoſe them to form Obſtructions: Hence in the Progreſs of this Diſtemper, the Symptoms are variouſly altered, and increaſed; a dry Cough proceeding originally from Obſtructions in the pulmonary Arteries, being at length attended with a moiſt, pituitous Expectoration from the bronchial Veſſels, and Obſtructions firſt formed in the bronchial Arteries, have been ſucceeded by latent Obſtructions, and Abſceſſes in the Lungs.

OBSTRUCTIONS formed in the pulmonary, or bronchial Arteries from a *Tenacity* in the Blood, are apt ſoon to terminate in a Suppuration; whereas Obſtructions formed from a languid Viſcidity, attended with an Acrimony, terminate in a Suppuration from a more ſlow Eroſion of the Veſſels; unleſs when a new Fluxion, and an inflammatory Diſtention of them accelerates that Progreſs.

OBSTRUCTIONS formed from an indolent Viſcidity, without Acrimony, have a various Termination, according to the particular Nature of the ſtagnating Humours, and State of the Veſſels: Sometimes the Glands, and their excretory Ducts, from a greater Viſcidity, become gradually more obſtructed, and diſtended; hence *Tubercles* are formed, attended generally with a dry Cough.

WHEN the ſtagnating Humours are of a more viſcid, and terreſtrial Nature, the Lungs become *ſchirrous*, and while they are thence indurated, and diſtended in ſome Parts, become flaccid, and collapſed in others, from the Want of ſuch Fluids as are neceſſary to lubricate, nouriſh, and diſtend them. Sometimes the obſtructing Humour is of a *calculous* Nature; and though ſuch Concretions are more common in the Kidneys, yet when there is that particular Diſpoſition in the

Fluids, they may be formed in any glandular Parts of the Body; and Books of Obſervation abound with Inſtances of this Kind.

From this Account of the different Cauſes, and Effects of Obſtructions in the Lungs, the Indications of Cure in each Species may be evidently deduced.

When Obſtructions are formed in relaxed Conſtitutions from frequent Defluxions, attended with an habitual Cough, the principal Indications are to reſolve, and diſengage the obſtructing Humours, to attenuate the Viſcidity of the Fluids, and reſtore the Diſcharges, and particularly that of Perſpiration, to their juſt Order, and Proportion.

The reſolving Gums, particularly *Ammoniac. Aſa fœtida, Sagapen. Opopan. Guaic.* Preparations of the *Millepedæ, Sapo Venet.* and the native Balſams deſerve a principal Place: Theſe may be made more effectual by the Decoctions, and Infuſions made from *Lign. Guaici, Saſſafras, Santal. Rub. et Citrin. Fol. Chamepyt. Hæder terreſt. Hyſſop. Scord. Veronic, &c.* Medicines of this Claſs anſwer theſe Intentions, as they are aperient, ſaponaceous, gently ſtimulating, and reſolving; and by enlarging the Blood's Motion, reſtore Perſpiration, and the other Diſcharges to their juſt Proportion.

But the Force of theſe Medicines, muſt be carefully ſuited to the Degree of the Obſtructions, and to the Conſtitution; for what are only endued with a ſufficient Activity to be ſerviceable in ſome Caſes, may be prejudicial in others.

Habitual Coughs, ariſing from fixed Obſtructions of this Kind, are generally attended with light, periodical Fluxions, generally towards the Evening, from the relaxed State of the obſtructed Veſſels, and Glands, and from the unavoidable Irregularity of the Diſcharges, and a growing, or partial Plenitude. On which Account the intermediate Uſe of mild Purgatives, ſuch as will not weaken the Body, or diminiſh Perſpiration, are very neceſſary, not only to prevent them, or leſſen their Force; but to make the former Regimen more ſafe, and effectual.

ALOETIC Medicines, ſuch as the *Tinctura ſacra, Pil. Ecphraſtic. Pil. Ruſi.* taken going to Reſt, and in ſmall Quantities, are particularly uſeful in theſe Intentions, and the Sea-Water, juſtly recommended by the ingenious Dr. *Ruſſel*; for Medicines of this Claſs, act as attenuating, warm Alteratives, while at the ſame Time they determine the ſuperfluous Humours to the Glands of the Inteſtines: But theſe are only uſeful in this *Species* of Obſtructions, attended with irregular Fluxions; and may be highly prejudicial in inflammatory Obſtructions, in an hectic, or too diſſolved State of the Fluids.

Mild Sudorifics are frequently found ſerviceable in habitual Coughs of this Kind; but though their Activity be greater, their Manner of Operation is the ſame with the Medicines already mentioned, which may be eaſily made Sudorifics, if determined with greater Force to the Surface of the Body; for what promotes only Perſpiration in one, with a different, and ſometimes with the ſame Management, will prove a Sudorific to another.

Sudorifics are ſometimes more quickly effectual than Medicines, which, by the Mildneſs of their Operation, only promote inſenſible Perſpiration; but the Relief is leſs permanent, and the Danger which attends their Uſe, in exciting too great a Motion in the Blood, is ſtill greater: On which Account, they are not to be inſiſted on; but when theſe Obſtructions are attended with a *languid* Circulation, frequent *returning* Fluxions, and an *acrid, ſerous* Plenitude, or when there is a natural Diſpoſition to ſuch breathing Sweats, and the Cough is ſenſibly relieved by them, in which Caſe they ought to be moderately promoted, and are not ſuppreſſed without Danger.

THE Diet ought to be light, and generous, fit to warm, but not to inflame the Blood, to nouriſh, but not to load the Veſſels. A ſolid Food, of the light animal Kind, is preferable to Liquids: Butter Sauces, and moſt Roots of the vegetable Kind are improper, as they increaſe the Viſcidity of the Humours, *Aſparagus, Water-Creſſes, Horſe-Radiſh, Onions,* and *Garlick,* are of a different Nature, attenuate, and promote Digeſtion,

ſtion, and Perſpiration[*], *Swine's Fleſh*[†], *Muſhrooms*, *Melons*, *Cucumbers*, and *Lettuce* from their Coldneſs, and Viſcidity, are particularly pernicious in theſe Caſes: Wine plain, in a moderate Quantity, is neceſſary to invigorate the languid Digeſtions, to maintain a proper Motion in the Blood, and to promote Perſpiration; when diluted with Water, is much preferable for common Drink to Malt Liquors, which are more apt to relax the Veſſels, and increaſe the Viſcidity of the Humours.

HENCE it appears, that *large diluting*, with pectoral Ptiſans, Barley Water, or Whey, (ſo indiſcriminately preſcribed ſometimes in Coughs) will always retard the original Cure of theſe Obſtructions, increaſe the Fluxion on the Lungs, leſſen

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[*] *Sanctor. Medicin. Static*, *Sect.* III. *Aph.* 82.

[†] *Aph.* 24. *Aph.* 25. *Aph.* 92.

Perſpiration, and make Expectoration more crude, copious, and difficult; which, after Sweats, and a moderate, increaſed Motion of the Blood, is always more digeſted, leſs in Quantity, and more eaſily expectorated; ſuch cooling Drinks can therefore be never proper in this *Species* of Obſtructions, but when a new Fluxion, the Violence of the Cough, or other Symptoms threaten an Inflammation in the obſtructed Veſſels.

Hence ariſes the great Difficulty in curing Obſtructions of this Kind, in their firſt Stage; as the ſame Regimen which is often neceſſary to guard againſt the Effects, and Progreſs of this Diſorder, will be apt to increaſe the *original* Cauſe, and as moſt Perſons are fond of purſuing the ſame Rules of Diet in their Intervals of Eaſe, which in their greateſt Diſtreſs, and Danger, afforded them moſt Relief.

Milk, under a proper Management, may be a uſeful Part of Diet to ſuch who are emaciated, or in whom the digeſtive Powers, and particularly the Lungs, are weak; but it does not anſwer the medicinal Intention, to which Diet ought likewiſe to contribute: It is apt to diſagree with Perſons of cold, relaxed Conſtitutions, and liable to Fluxions, but in theſe Caſes may be much improved, by being mixed with *Lime-Water*.

When the Obſtructions are by theſe Means removed, or ſo far leſſened, that no Danger of any future Inflammation remains, Preparations of the *Peruvian Bark*, *Chalybeat Waters*, and Medicines of that Kind, are of the greateſt Efficacy: Theſe are not only neceſſary to correct the original Cauſe, but to reſtore Strength to the Veſſels, and Glands, which have been more particularly affected; for though Obſtructions at firſt are in ſome Meaſure owing to the Capacity of the Veſſels not being ſufficiently large to give a free Paſſage to the Humours; yet in their Progreſs they muſt become greatly *diſtended*, and from the remaining *Weakneſs*, and *Relaxation*, will be again eaſily apt to be loaded, and obſtructed, from a Cauſe different from that which firſt produced this Diſtemper.

FROM a Neglect of this Obſervation, Perſons who have been affected with habitual Coughs, are ſo apt to relapſe into the ſame Diſorder; for as no Obſtruction is removed, till the *diſtended* Veſſels begin to recover their reciprocal tonic Motion, ſo to prevent a new Collection, their relaxed Spring muſt be *reſtored*, and *preſerved*.

NOTHING more effectually contributes to promote this Intention, than Exerciſe, and particularly *Riding*; for the Preſſure of the Air on theſe weakened Veſſels, increaſes in Proportion to the *Velocity* of the Body in Motion, and by being *elaſtic*, re-acts with the ſame Force as it is acted on; by which Means the relaxed, and diſtended Veſſels are compreſſed, and ſtrengthned, the contained Humours attenuated, and preſerved in a juſt Degree of Fluidity.

HENCE it appears, that this Exerciſe, not only as it is leaſt liable to a Waſte of Strength, and Spirits; but likewiſe from this *increaſed Preſſure*, is preferable to any other, not attended with ſuch a Velocity in the Body; and why ſuch conſiderable Effects are produced from it in this Diſtemper, is evident to ſuch who conſider, that the circulating Humours receive their moſt material Alterations from the Action of the Lungs, and how that in a great Meaſure depends on the Preſſure of the Air; whoſe Gravity may be thus increaſed to any Degree deſired, and the bad Effects of ſuch a Diſpoſition of the Air, as frequently brings on theſe Obſtructions, moſt effectually prevented.

HENCE appears the Reaſon, why a Sea-Voyage, eſpecially in a more dry, and warm Climate, has often removed *habitual* Coughs, which have not yielded to any other Regimen.

THE Uſe of the Fleſh-Bruſh, is likewiſe very ſerviceable, as it powerfully ſtrengthens, and cleanſes the perſpirable Veſſels, and attenuates the Humours on the Surface of the Body; which, by their great Diſtance from the Heart, and by being moſt expoſed to external Cold, are particularly apt to be obſtructed.

WHEN Obſtructions have been formed in the Lungs from more *acute* Fluxions, and an *inflammatory Tenacity* in the Humours,

mours, Bleeding mnſt be repeated, whenever the Quickneſs of the Pulſe, the Violence of the Cough, a difficult, or painful Breathing increaſes, or returns. Evacuations likewiſe by lenient Purgatives, ſuch as *Manna, Sal. Polychreſt. Electuar. e Caſia*, muſt be frequently uſed, with mild Anodynes at Night, to moderate the Cough, and give Reſt to the Lungs.

When the Force of theſe Obſtructions is thus diminiſhed, they will in Time eaſily yield to a diluting, reſolving, and gently deterging Regimen. Medicines of the *nitrous* Kind, diſſolve this Tenacity in the Fluids; when combined with others of a more active, attenuating Nature, they become more powerful, ſuch as the *Stibium Diaphoreticum Nitratum*, which is the beſt Preparation of that Kind; among this Claſs may be likewiſe ranged, the *expreſſed Juice of the Woodlice, neutral Salts*, with ſuch as are of a more oily, and ſaponaceous Kind, *Sperma Ceti*, *Mixtura oleoſa*, *Oxymel Simplex*, *&c.* The Efficacy of theſe may be promoted by pectoral *Ptiſans*, and medicated Wheys, prepared with Ingredients ſuited to theſe Intentions, ſuch as *Fol. Agrimoniæ*, *Betonicæ*, *Parietariæ*, *Taraxaci*, *Hæderæ terreſtris*, *Flor. Hyperici*, *Altheæ*, *Rad. Glycyrrhizæ*, *&c.* *Goat's Whey*, the *Briſtol*, or *Mallow Waters* are particularly uſeful in this Species of Obſtructions; and during their Courſe, ſome of the milder deobſtruent *Gums*, may be ſafely, and more effectually uſed.

The Diet ought to be light, and cooling; Aſſes Milk is particularly uſeful, eſpecially during the Uſe of the *Briſtol*, or *Mallow* Waters. Preparations of the vegetable, are preferable to thoſe of the animal Kind; of which laſt, the lighter white Meats are only to be taken ſparingly. Wine, unleſs largely diluted, is to be avoided. The *Exerciſe* ought to be *moderate.*

WHEN Obſtructions of the pulmonary Arteries proceed from an *indigeſted,* viſcid Chyle, the evident Indications are to reſtore the impaired Digeſtions, and to reſolve the impacted Humours.

THESE are anſwered by ſuch Medicines as diſengage, and ſtrengthen the Stomach, and Bowels. Mild Stomachic Purgatives, ſuch as *Tinctura ſacra, Pil. Rufi, Elixir proprietatis* ; and Preparations of *Rhubarb* not only anſwer the former Intention, but contribute to diminiſh the Obſtructions : Light Bitters are deſervedly eſteemed, for ſtrengthning, and reſtoring the digeſtive Powers, and attenuating cold, viſcid Humours, in which they emulate the *bilious* Juice, which chiefly contributes to give the Chyle a proper, and uniform Conſiſtence :

tence: On which Account, the *Bile* of voracious Animals, and particularly the *Pike,* made up freſh with the *Species Aromaticæ,* and *Extract. Gentianæ* has often reſtored ſome who have been in a languid State, from a Loſs of Appetite, and Indigeſtion, where the moſt elaborate, chymical Medicines have failed.

When the ſecond Digeſtion is likewiſe deficient, the Peruvian Bark, and ſome of the Preparations of Iron, or natural Waters impregnated with it, are of the greateſt Efficacy; when the State of the Obſtructions in the Lungs will ſafely admit the Uſe of them. Medicines therefore peculiarly adapted to reſolve, and diſengage them, muſt be previouſly uſed, or united with them; which have been already fully directed in Obſtructions proceeding from a languid Viſcidity in the Humours.

Until the Digeſtions are reſtored, and ſtrengthened, the Diet ought to be of the lighteſt Kind. Exerciſe is moſt neceſſary, as it more particularly promotes Digeſtion, and the Secretion of the Bile, which in theſe Caſes is either deficient, or too inactive; for the *chylopoictic* Bowels are leſs influenced, than any other by the general Circulation, and Motion of the Heart, and may be conſidered as a ſmall *ſeparate Republic* in the Body, which is governed by more peculiar Laws, and chiefly by muſcular Motion.

When theſe Obſtructions are attended with nervous, and hypochondriac Symptoms, *Aſa fœtida* is of the greateſt Service, and deſerves a principal Place. The Activity of its Parts, corrected, and retained in a ſoft, gummy Subſtance, renders it in theſe Caſes more ſafe, and effectual, than *volatile* Spirits, which ſtimulate with more Force, and give but a ſhort, and tranſient Relief; for the ſame volatile Activity on which their Virtues depend, prevent it from being laſting: They are like Spurs to a jading Horſe, which may be ſometimes neceſſary to quicken his Motion, but will the ſooner tire him: Whereas *Aſa fœtida*, by the peculiar Diſpoſition of its Parts, gives a more laſting, and equal Determination to the Spirits; for no Bodies are more apt to affect the Nerves in an agreeable Manner, than ſuch which conſiſt of volatile Parts, whoſe Activity is tempered, and allayed by the Smoothneſs of ſuch which are lubricating, and oily. This Medicine is therefore not only ſerviceable in languid Obſtructions of the Lungs, as it gently ſtimulates, and attenuates the Viſcidity of the Fluids, and particularly promotes Perſpiration *, but likewiſe enlarges the Capacity of the obſtructed Veſſels, by removing the nervous Contractions, and Spaſms, which in ſome Meaſure render hypochondriac Perſons more particularly liable to this Diſtemper. In this Part of its Character, and Manner of Operation, it is ſomewhat allied to Opiates *, but not ſubject to the ſame Inconveniencies; and on that Account, will frequently procure Reſt, when Medicines of that Kind are ineffectual, and prejudicial.

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* *Sanctor. Medicin. Static. Sect.* III. *Aph.* 82.

HENCE appears the Reaſon, why eaſy, and agreeable Amuſements, are ſo neceſſary to Perſons in this firſt Stage of a Conſumption? Obſtructions will continue fixed, and obſtinate, while the Nerves are affected in an uneaſy Manner; theſe are therefore neceſſary in all Caſes of this Kind, but eſpecially in ſuch

whom

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* *Vid. Mead's Eſſay on Poiſons, P.* 146.

where the languid Lentor in the Humours was owing *originally* to Melancholy, and an inactive Life; and on this Account, conſtant, moderate Exerciſe, particularly travelling to new Places, gives the moſt effectual Relief to thoſe Perſons.

When the Humour obſtructing the Glands is of a cold, viſcid Nature, apt to form *Tubercles* of that Kind, or *ſtony* Concretions, the more warm deobſtruent Gums, ſuch as *Sagapenum*, *Guaicum*, with native *Cinnabar*, and *Caſtile Soap*, moſt powerfully contribute to diſſolve, and diſengage them, eſpecially when aſſiſted by *Lime-Water*.

By a Regimen of that Kind, an eminent Lawyer was cured of an obſtinate, dry Cough, which confined him for near three Months; he expectorated at Length ſeveral Stones, and a viſcid, jelly Kind of blue Phlegm; he was ſoon then relieved from his former Complaints, and by continuing the ſame Courſe for ſix Months, has continued free from any Return, though before frequently ſubject to a dry Cough.

BONETUS * mentions a remarkable Caſe of a Perſon, who received no Relief from other Medicines, who, by taking three Mornings ſucceſſively one Scruple of a fixed Salt, expectorated ten Fragments of a calculous Nature; and tho' greatly emaciated, and oppreſſed before, quickly recovered after this Diſcharge.

ALL fixed, alkaline Salts, contain Properties of the ſame Nature, and act in ſome Meaſure like Lime-Water, but with leſs Activity; but in ſo ſmall a Quantity, it could not have produced ſuch an Effect, unleſs the Glands had been eaſi-

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* *Anatom. Practic. Tom* I. *Lib.* 2. *Sect.* 2.

ly diſpoſed by the Aſſiſtance of that attenuating Medicine, to give a Paſſage to theſe calculous Concretions.

WHEN theſe Obſtructions are attended with a *ſaline Acrimony*, (as ſuch moſt frequently are, which proceed from a languid Viſcidity) it not only increaſes them, by drawing the tender Veſſels of the Lungs into greater *Contractions*; but by *eroding* them accelerates their Progreſs to a Suppuration.

IT is evident, from the moſt exact chymical Experiments, that the eſſential Salts of the Humours in a human Body, are in a natural State neither *fixed*, nor *volatile*, but of a *ſemifixed* Nature, and become morbid, and pernicious, when they deviate from this healthy Standard, and are either too much *fixed*, or too *volatile*; or when their *Quantity* is increaſed in too great a Proportion to the other Principles of the Humours.

When the Circulation, from any Cauſe whatever, is rendered ſlow, and languid, the Humours not only become viſcid, but the ſaline Parts are not ſufficiently actuated, or equally mixed with the oily Parts of the Blood; and from the Slowneſs of their Motion, are particularly apt to be ſeparated by the glandular Parts, to irritate, and obſtruct them. This Conſtitution prevails chiefly in ſuch whoſe Fibres, and particularly theſe of the glandular Syſtem are relaxed, and often irregularly formed; eſpecially when they lead an *inactive* Life, and uſe chiefly a *low*, *acid*, and *vegetable* Diet.

Hence appears the Reaſon, why *ſcrophulous* Perſons are more particularly ſubject to glandular Obſtructions in the Lungs; and why *external* Tumours of that Kind, if they ſuddenly diſappear, are generally ſucceeded with a fatal Phthiſis: The Force of Circulation being then more languid, the Viſcidity, and acrid State of the Humours increaſe, and the internal, glandular Syſtem is more eaſily affected: On which Account, a light, generous Diet, chiefly of the ſolid Kind, with the moderate Uſe of Wine, conſtant Exerciſe, and Frictions, are moſt neceſſary in this Species of Obſtructions.

Artificial Lime-Waters, ſome Preparations from them, ſuch as the *Aq. Calc. mag. et min. Compoſit.* particularly, and almoſt *ſpecifically*, contribute to attenuate viſcid Obſtructions, proceeding from this languid *Lentor* in the Fluids; as by their *Activity*, they correct theſe ſaline Parts, and render them more *volatile*: For it is evident from chymical Experiments, that Quicklime gives the greateſt Activity to animal Salts, and Oils; which Property it ſeems to receive from the Particles of Fire which are intimately united with it.

But Medicines of this Kind muſt be uſed with Caution, and ſuited to the Conſtitution, and Degree of the Diſtemper; for they may act with too much Force in *fixed* Obſtructions, eſpecially when attended with any Degree of Fluxion, or feveriſh Heat: On which Account, they become more effectual, and ſafe, when diluted with Milk, and aſſiſted with mild Evacuations, and ſaponaceous, and deobſtruent Medicines.

Where the Humours are *diſſolved*, and inclined to *Putrefaction*, the ſaline Parts too naked, and *volatile*, all Preparations of *Quicklime* give a dangerous Increaſe to theſe Symptoms: This Conſtitution of Humours is natural to ſome, and moſt frequently attends ſuch as are ſubject to a Conſumption from a preceding *Hæmoptoe*, as the former are more liable to it from *Obſtructions*. It is greatly encouraged by the too free Uſe of an animal

Diet, eſpecially ſuch as is high-ſeaſoned, or is moſt remarkable for the Delicacy of its Flavour, and moſt plentifully abounds with volatile Salts.

WATERS which paſs through natural Lime-Stone, or chalky Ground, ſuch as thoſe of *Briſtol*, and *Mallow*, which widely differ from artificial Lime-Waters, are likewiſe very uſeful, as they dilute, and ſheath the Aſperities of theſe Salts, eſpecially when taken with Milk. A Milk Diet, the mild, cooling, antiſcorbutic Juices, Preparations of Snails, and ſoft Diuretics are proper to correct the Acrimony of theſe Salts, and determine them to the Kidneys, which ſeem to be the moſt proper Channel for conveying them out of the Body.

HENCE may be explained, that Obſervation, which is mentioned * in the

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* *Anno* 1700.

Memoirs of the Royal Academy at *Paris*, as obſcure, as ſurpriſing: *Why ſome Preparations of Quicklime are given with ſo much Succeſs in ſcorbutic, and other chronic Diſorders in the northern Countries; but are found inſufficient, and frequently prejudicial in the ſame Diſeaſes, when given to ſuch as live in* France, Italy, *and other Places that are more towards the South?* The Humours of the latter, by the *Warmth* of the *Climate*, are greatly actuated, and attenuated, whence the ſaline Parts, already too active, by the Acceſſion of ſuch a Medicine, are eaſily more volatized, and exalted. Whereas the Fluids of ſuch as live in cold, *northern Climates*, are languid in their Motion; and the ſaline Parts are thence ſo involved in the terreſtrial, and oily Parts of the Blood, as to require the Uſe of ſuch an active Preparation to diſengage them.

Hence likewiſe appears the Reaſon, why Lime-Waters ſo powerfully contribute to diſſolve Stones formed in the Kidneys, and Bladder, not only by *attenuating*, and *diſſolving* the *oily Cement*, which *unites* them with the terreſtrial Parts; but by giving a more *volatile* Activity to the *ſaline* Parts? and why perhaps they may be more particularly adapted to ſome Conſtitutions not only as a *ſolvent*, but to *correct* that particular Diſpoſition in the Fluids to form ſuch Concretions; while in others of a contrary Conſtitution, they may be leſs effectual in their Operation, and if too long inſiſted on, bring on other Diſorders?

HENCE it appears, that as the Cauſes which produce Obſtructions in the Lungs, are very different, and in their Progreſs are ſometimes blended together, ſuch Evacuations as may be uſeful in one Species, or Stage of this Diſorder, may become prejudicial in another.

EMETICS are often neceſſary in ſome Circumſtances of this Diſeaſe, as they diſengage the firſt Paſſages, and particularly the Stomach, from indigeſted Humours; and in languid, and nervous Conſtitutions, leave the Body more free, and the Diſcharges more regular, than purgative Medicines: They often likewiſe contribute, by their Action, to promote *Expectoration.* But they are to be carefully avoided during the Time of violent Fluxions, eſpecially of the acute Kind, in Perſons who have a narrow Cheſt, and who vomit with Difficulty, and who are liable to an Hœmoptoe: In this laſt Caſe, however, they have been ſtrongly recommended by an eminent Author, as the moſt effectual Remedy to ſtop an Hœmoptoe; which Effect, he thinks, is produced by leſſening the Blood's Motion during the Sickneſs in the Stomach, and their Operation. It is certain, that while the Sickneſs continues, the Pulſe is always weak, and quick; but during the Operation often becomes quick, and ſtrong, and gradually acquires more Strength for ſome Time afterwards. Emetics may from a contrary Effect have ſometimes ſucceeded, in a ſlow, continued, or frequently returning Hœmoptoe from the *bronchial* Veſſels; eſpecially in the ſuperior Parts of the *Tracheæ*, by diſengaging in their Operation the viſcid Phlegm which *diſtended* the Glands, and prevented a free Circulation through their Veſſels; but in an Hæmoptoe from the pulmonary Arteries, muſt not only be ineffectual, but dangerous. *Hippocrates* frequently recommends them in different pulmonary Diſorders; but not only forbids them in this Species * of a Conſumption, but mentions violent Vomiting † as one of the principal Cauſes which is apt to bring on an Hœmoptoe; and *Tulpius* ‡ takes Notice of one affected with a Defluxion, and Cough, from pituitous Obſtructions in the pulmonary Veſſels, who by the

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* *Sect.* IV. *Aph.* 8. † *De Interis Affect.* et *de Morb. Lib.* I. *Sect.* V. ‡ *Lib.* II. *Obſ.* 14.

Uſe of an antimonial Vomit, was ſeized with a violent Hœmoptoe, attended with an Expectoration of a large Piece of the Lungs, of which he immediately expired.

ISSUES will be ſerviceable in Obſtructions of the Lungs, attended with frequent returning Defluxions, or a ſerous Plenitude; but in *emaciated* Conſtitutions, and purulent, hectic Caſes, they are not only ineffectual, but prejudicial; increaſe the Waſte, and the hectic Fever. *Hippocrates* frequently recommends them, made with the actual Cautery, or the Knife, in pulmonary Diſorders; but it is very remarkable, that he always repeats this Caution *, that the Body ſhould be *firſt recruited*, and *fattened* with a *Milk* Diet: On which Account, he directed them, rather to prevent the Return, than as a Cure of the Diſeaſe. However, it may be dangerous to cloſe them ſuddenly in ſuch Perſons as have been long habituated to them, without ſubſtituting ſome other Evacuation in their Place.

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* *De Internis Affect. Sect.* V.

Hence likewiſe it appears, that ſuch *alterative*, or *expectorating* Medicines as may be uſeful in one Species, or Stage of this Diſorder, may become prejudicial in another.

Obstructions in the pulmonary Arteries cannot be diſengaged by Expectoration, (except after an Hæmoptoe, or Suppuration) as they terminate only in the pulmonary Veins: This can be only obtained from the bronchial Glands, which are diſperſed through the whole internal Surface of the *Trachæa Arteria*, and its Ramifications: Theſe, in a natural State, conſtantly ſeparate a uſeful, defending Mucilage; but whenever the Ex-

Extremities of the bronchial Arteries are obſtructed, the ſmall *lateral* Branches, which inveſt theſe Glands, receive, and ſeparate a greater Quantity of Fluids, which, by diſtending them, and ſtagnating there, acquire a various Conſiſtence, and are diſcharged from their large excretory Ducts by *Expectoration.*

THE Quantity, and Nature of the ſeparated Humours, the Time of their Stagnation, the different Degrees of Heat with which they have been agitated, the State of theſe Glands, and the expelling Force of the Lungs, and of the pectoral Muſcles, will give a *various Conſiſtence* to the collected Humours, and render the Expectoration of them more eaſy, or difficult.

BUT though this Structure of theſe Arteries is different, yet the Medicines which are proper to diſengage Humours which obſtruct the *pulmonary* Arteries, operate with the ſame Qualities, and in the ſame Manner as theſe which promote *Expectoration* from the *bronchial* Glands. The only Difference is, that by being duly prepared, they are in the former, propelled by the Force of the Heart into the pulmonary Veins; in the latter, by Coughing into the *Trachæa Arteria*, and thence expectorated.

HENCE it appears, that *expectorating* Medicines muſt, equally with thoſe of the *alterative* Kind, be ſuited to the particular State of the Veſſels, and Humours; and that what is a uſeful Pectoral in one Caſe, may become prejudicial in another.

UNTIL the collected Humours are *prepared*, and *digeſted*, they can never be expectorated with Eaſe. In acrid, thin Fluxions, Evacuations with ſuch Medicines as promote inſenſible, or ſenſible Perſpiration, and moderate the Cough, become the beſt *Pectorals*, by leſſening the Fluxions, and giving the ſtagnating Humours Time to acquire a proper Conſiſtence. In cold, viſcid Collections, and a Flaccidity in the Lungs, and pectoral Muſcles, attenuating, ſtimulating, and warm Medicines, ſuch as Preparations of the *Squills*, *Garlic*, and *Ammoniacum*, and the *native Balſams*, which excite the Cough, and agitate the ſtagnating Humours with greater Heat, become then the beſt Expectorants; when the Humours have an *inflammatory* Viſcidity, and the Veſſels are *contracted*, *Bleeding*, and the ſofteſt Pectorals, which correct the Heat, and Acrimony of the Humours, relax, and lubricate the Veſſels, can only promote a proper Digeſtion, and a more eaſy Expectoration.

If any Medicines immediately act as *topic* Pectorals, they muſt be conveyed with the Air, impregnated with ſuch Steams, or Vapour as are fit to correct the bad State of the Lungs, and of the Humours ſeparated, and collected in the Glands. Thus when from a Weakneſs in their Veſſels, they are ſubject to a Suffuſion of thin, acrid Humours, a Fumigation of *Olibanum, Maſtiche,* and *Benzoin* of the Balſam of *Tolu,* will contribute to ſtrengthen them. But Preparations of this Kind act with more Safety, and Efficacy when the Lungs are moſt free, and diſengaged from any Load of Humours. When the Veſſels are too contracted, and the Humours to be expectorated glutinous, and viſcid; an *Evaporation* from hot Water, impregnated with *Fol. Hyſſop, Roris marin, Meliſſ. Rad. Enul. Sem. Aniſi.* will be the moſt effectual Pectoral.

This Part of Medicine has been too much neglected, perhaps on Account of the Difficulty which firſt attends receiving Steams, and Vapours into the Lungs; but after the firſt Irritation is over, if they are properly ſuited to the State of the Lungs, they are no longer troubleſome. I have frequently uſed them in the firſt Stage of a Conſumption, and found them ſerviceable; but *Bennet* *, who has given ſome excellent practical Obſervations, and Rules in this Diſtemper, but in a very obſcure Manner, not only recommends them in theſe Caſes, but mentions ſeveral Inſtances of a confirmed Phthiſis cured chiefly by the Uſe of them; and gives ſeveral Forms fit for correcting *Putrefaction*, and *cleanſing* foul Ulcers; but it is to be lamented that he conceals one Ingredient, which, he ſays, was the principal Baſis of them.

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* *Theatrum Tabid.*

PREPARATIONS of Oils, Syrups, and anodyne Medicines, ſo much recommended as Pectorals, act chiefly as Palliatives, by allaying the Violence of the Cough, and can only anſwer that Intention when the Glands in the ſuperior Part of the Trachæa have been abraded by frequent Coughing, and deprived of their defending Mucilage; or when the Humours ſeparated from theſe Glands are thin, and acrid, and give a frequent Irritation to thoſe naked Parts. The Relief which the former affords, is ſo ſudden, that their Efficacy cannot be imputed to their altering the Humours, but only to giving an immediate ſoft Defence to theſe Glands, which are moſt apt to be abraded in this narrow Paſſage, by the Force with which the Air is expelled in Coughing.

OPIATES and Anodynes, as they anſwer the other Intention, are the more re-

remarkable in relieving Coughs; for by rendering the Fibres leſs ſenſible, they elude the Force of the uneaſy Irritations, not only in the ſuperior Part of the Trachæa, but in its diſtant Ramifications, where the other Medicines are ineffectual; by which Means the ſeparated Humours have Time to acquire a ſoft, and proper Conſiſtence.

HENCE it appears, that oily, and ſweet Subſtances, in Regard to the original Obſtructions, are often prejudicial: In bilious, and inflammatory Conſtitutions they become rancid; which is evident from the remarkable Fætor which they give to the Excrements: In languid Obſtructions they weaken the Stomach, and increaſe the Viſcidity of the Humours; and in Defluxions, by relaxing the Glands, they encourage a greater Influx of Humours: On which Account, they ought to be taken only in ſmall

Quantities, and gently ſwallowed, as what adheres, is only uſeful: Lozenges formed of mild Aſtringents, Sugar, and ſoft Mucilages, ſlowly ſwallowed, are preferable to oily Preparations, as they contribute to reſtore the relaxed Tone of the Glands, and give a ſoft, and more laſting Defence, to allay the uneaſy Irritations.

SECT. IV.

Of an Hæmoptoe.

THE Cauſes pre-diſpoſing to an *Hæmoptoe*, or a Diſcharge of Blood by Coughing, are various; but may be reduced to whatever gives the Veſſels of the *Lungs* ſuch a *Tenderneſs*, and the *Humours* ſuch a *Force*, and *Acrimony*, as muſt, if increaſed, diſſolve their *Continuity*.

This Pre-diſpoſition, generally conſiſts in an univerſal Weakneſs of the Solids, and that volatile *Acrimony*, and *Diſſolution* of the Fluids, which has been already deſcribed, and is peculiar to ſuch conſumptive Perſons.

This Conſtitution to ſome is natural, and hereditary; but is often acquired in others by an intemperate Uſe of a hot, aromatic, ſaline, or animal Diet; or by previous Diſorders, which relax the Veſſels, and deprive the Blood of its oily, and balſamic Parts, and renders its Salts too active, and volatile.

A NATURAL Pre-diſpoſition to an Hœmoptoe, may be eaſily diſtinguiſhed by ſeveral Symptoms, which are peculiar to ſuch Conſtitutions, *viz.* a long Neck, narrow Shoulders, *Scapulæ* prominent like Wings, Thorax compreſſed and ſmall, a clear, florid Complexion, the Cheeks, and Lips being often painted with the pureſt red, the *Caruncle* in the Eye, from its intenſe Colour, appearing like Coral, and all the Veſſels ſo fine, that they ſeem almoſt tranſparent; ſuch Perſons are likewiſe remarkable for a Vivacity of Mind, and often complain of a light Diſtillation, and a ſaline Taſte in the Mouth.

In Conſtitutions either naturally, or otherwiſe thus pre-diſpoſed, whatever determines the Humours to the Lungs with a *Force* greater than their *Reſiſtance*, will immediately produce an Hœmoptoe. Theſe Cauſes are various, ſuch as a hot, ſaline, aromatic Diet, or Spirituous Liquors, violent Exerciſe of the Body, particularly of the Lungs by Coughing, or Vomiting, ſtrong Paſſions of the Mind; or any uſual Secretions, or Evacuations prevented, and in general may be reduced to whatever increaſes the *Acrimony*, *Quantity*, or *Velocity* of ſuch Fluids.

Whatever increaſes the Quantity will increaſe the Velocity, and Preſſure of the Fluids on the Veſſels of the Lungs; but if the Liquids taken be of a hot, acrid Nature; or if the Humours retained have that Diſpoſition, their Velocity will be increaſed proportionally.

Hence all ſanguineous Diſcharges ſuppreſſed, ſuch as the *Hæmorrhoids* in Men, the *Catemenia* in Women, or ſharp, habitual *Tetters* diſappearing, are more particularly apt to produce an *Hœmoptoe*.

Hence appears the Reaſon, why ſuch who have amputated Limbs, and are of a warm Conſtitution, are more liable to an Hœmoptoe; and if of a more relaxed Habit, to Catarrhs, and Defluxions? and why it more frequently happens in young Perſons, eſpecially at the Time when the Body deſiſts from growing? the Quantity, and Preſſure of the Fluids, being then more particularly increaſed, by not being expended as before, in giving a conſtant Addition to the Veſſels; which are thence likewiſe more liable to a Rupture from their greater Reſiſtance, than when they yielded more to the Impulſe of the circulating Fluids.

Hence likewiſe appears the Reaſon, why an Hœmoptoe ſeldom happens before the Age of Eighteen, or after Thirty-five *. For before that Time the Impulſe of the Humours is but weak, and the Veſſels are pliable, and yielding; and afterwards, by repeated Motions, they become compacted, and firm, and thence more capable of reſiſting the Impulſe of the circulating Fluids.

When the Veſſels of the Lungs are *obſtructed*, and *diſtended* from any of the Cauſes before-mentioned, whatever increaſes the *Velocity*, *Quantity*, or *Acrimony* of the Fluids, will be apt to produce an Hœmoptoe: For the Weakneſs of a Veſſel is always in Proportion to its *Diſtention*; and on that Account, ſuch Perſons have always a Pre-diſpoſition to an Hœmoptoe, not only from ſuch a

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* *Hip. Sect.* V. *Aph.* 9.

Diſtention in the Veſſels, but from the corroding *Acrimony*, which the obſtructing Humours by ſtagnating are apt to acquire.

The Seat of an Hœmoptoe is either in the *pulmonary*, or *bronchial* Arteries, and may be eaſily diſtinguiſhed by the different Symptoms which attend it: In an Hœmoptoe of the pulmonary Arteries, the Quantity of Blood expectorated is large, of a thin Conſiſtence, and a florid Colour, without any Senſe of Pain, and the Diſcharge entirely ceaſes for ſome-time. In an Hœmoptoe of the bronchial Arteries, the Quantity of Blood is but ſmall, but continued for a longer Time, its Colour more obſcure, its Conſiſtence greater, and often mixed with Phlegm, and is generally attended with a Senſe of Pain in the Breaſt.

That the Seat of an *Hœmoptoe* may be likewiſe more exactly known, the

Manner in which the Blood is diſcharged, muſt be particularly regarded; for what is *hawked* up, comes only from the Palate, or Veſſels about the *Larynx*, what is ſpit out from the Mouth, what is *vomitted* from the Stomach, what is diſcharged by a *ſmall Cough*, and more *difficult* hawking from the Veſſels in the ſuperior Parts of the *Trachæa Arteria*; and the deeper the Rupture is in the Veſſels of the Lungs, the more *profound*, and *violent* Cough attends the Expectoration.

SOMETIMES an *Hæmoptoe* of the *bronchial Arteries* is preceded by a Repletion, and Senſe of a greater Weight than uſual, occaſioned by a Retention of ſome habitual ſanguineous Evacuation, ſuch as the *Hæmorrhoids* in Men, and the *Catamenia* in Women, and is then leſs dangerous, and often not ſucceeded with an *Inflammation*, or Collection of *purulent* Matter; in which Caſe there is no Rupture, or Diſunion of the Veſſels; but their extreme Orifices which in a natural State, ſeparated, or exhaled, are then only ſo *dilated,* as to admit a Diſcharge of this *plethoric* Blood, after the ſame Manner as it is *periodically* evacuated by the uterine Arteries.

AFTER an *Hœmoptoe,* particularly of the pulmonary Arteries, lying on the affected Side is apt to renew the Diſcharge, the Veſſels then being more preſſed, and irritated. Sometimes the Oppreſſion has remarkably increaſed by this Poſture, and immediately been relieved by lying on the contrary Side.

THE Indications of Cure in an Hœmoptoe, are to *re-unite* the ruptured Veſſels, and to correct the *Heat,* and *Acrimony* of the Humours.

To anſwer the firſt Intention, Bleeding is to be freely uſed, and repeated, until the diſunited Veſſels are almoſt *collapſed,* their Orifices thence *cloſed,* and the Motion of the Humours circulating through them, becomes ſo *languid,* as to be incapable of *widening,* and *opening* them again.

If the Veſſels are thus kept in ſuch a State, they will either re-unite by the *firſt Intention,* or by a very light, *ſuperficial* Suppuration; without which, a Wound, though ever ſo ſmall, is ſeldom healed, and muſt therefore be generally attended with ſome Degree of a *topic* Inflammation: But by leſſening the Quantity of the Blood this may be effectually reſtrained within its juſt Limits, and any farther Suppuration prevented, than what is neceſſary to re-unite the Veſſels; for the ſucceeding Suppuration will be always in Proportion to the Inflammation: On which Account, when this Evacuation has been neglected, or not ſu-

ſufficiently carried on, an Hœmoptoe of the pulmonary Arteries, is generally ſucceeded by a *latent Abſceſs*, and a Collection of Matter under the wounded Part; and ſome ſurpriſing Inſtances have been known of large Wounds received in the Lungs, attended with a great Effuſion of Blood, when the Perſon thus affected, has remained half-dead, and expoſed to the cold Air a conſiderable Time, and by being thus fortunately neglected, the Wound has re-united, and a perfect State of Health ſucceeded, which had been probably loſt, if he had been revived by Cordial Medicines, and the Motion of his Blood increaſed.

MEDICINES which mildly *ſtrengthen* the Fibres, and render them leſs irritable, which are *antiſeptic*, and reſtrain the Blood's Motion, ſuch as the *Cortex Peruvianus*, *Folia plantaginis Acetoſellæ*, *Flores pentaphyll. rub. paluſt. Roſar. rub.*

Semina Acetoſæ, papav. alb. radices Urticæ Argentin, pimpenel. with ſoft, ſmooth Balſamics, which correct the Heat, and Acrimony of the Humours, ſuch as *Folia Tuſſilaginis, Pulmonar. Flores puri recentes Betonicæ, Hyperici, Altheæ, Gum Arabic. pulv. Hali, ſpecies Diatragacanth. frigid.* are moſt proper to anſwer theſe Intentions.

THESE Medicines (of the vegetable Claſs) are moſt effectual when prepared by Infuſion, or Decoction, becauſe in no other Form they can ſo eaſily paſs thro' the Veſſels, and communicate their Virtues to the Blood.

SEVERAL Authors are of Opinion, that an *Hæmoptoe* may be cured by proper, *ſpecific* Medicines, which particularly exert their Efficacy on the wounded, or diſtended Veſſels. But it is very evident to any one who underſtands the

Animal Oecomony, and the Operation of Medicines, that ſuch which are found by Experience to be uſeful, cannot act in a *topic*, but in an *univerſal* Manner; and that the ſtopping of an Hœmoptoe, is either the natural Conſequence of a large Effuſion of Blood (the Veſſels being thereby ſufficiently *emptied*, and *collapſed*, and the *Force* of the circulating Fluids from the ſame Cauſe rendered more ſlow, and languid) or that theſe Effects are produced by artificial Evacuations, and ſuch Medicines which *reſtrain* the *Heat*, and Motion, and *correct* the *Acrimony* of the Humours; for if Medicines, by particularly exerting their Virtues on the wounded Part, could ſtop an *Hœmoptoe*, their Operation muſt either conſiſt in *incraſſating* the Blood to ſuch a Degree as to be no longer capable of flowing through the opened Orifice, or in giving to this ſuch a Degree of *Contraction*, as may be ſufficient to prevent any further Effuſion, or by anſwering both Intentions. But if it were in the Power of any Medicines to give ſuch a Diſpoſition to the Fluids, it muſt thence follow, that the Blood, which cannot paſs through the wounded Veſſels, muſt be likewiſe incapable of circulating through the Extremities of the other Arteries, which are only capable of admitting one Globule of Blood to paſs through them, and whoſe Diameter is always leſs than that of the opened Veſſel, and muſt therefore ſoon produce a fatal *Peripneumony*: If ſuch Medicines could anſwer the ſecond Intention, by their *aſtringent* Qualities, they muſt produce the ſame Alteration in the Extremities of the Arteries, before they could exert their Virtues on the wounded Veſſels; and thence likewiſe a *Peripneumony* muſt unavoidably follow: So that Medicines, in this Caſe, can only prove uſeful as they produce the Changes beforementioned, unleſs ſuch Perſons have an

Art of conveying the Efficacy of their Medicines particularly to the wounded Part, which it is abſurd to ſuppoſe: Some have probably fallen into this Error, from obſerving, that the Diſcharge of Blood generally ceaſes ſoon after the Uſe of their Medicines; but this, as I before took Notice of, is the natural Conſequence of a large Effuſion of Blood: On which Account, very few Inſtances are ſeen of ſuch who die of an Hœmoptoe, except in acute Diſtempers.

NEITHER doth the other Claſs of Medicines, which, from a miſtaken Notion of their Manner of acting, are called *Balſamics*, prove ſerviceable as ſuch; for the true Operation of Balſamics, in the Cure of external Wounds, conſiſts in affording a kind, ſoft *Medium* between the Air, and the Exhalations ariſing from the Wound; which by that Means being retained, a *topic Fever* is excited, which changes the extravaſated Humours into a laudable *Pus*. This is the *Baſis* which ſuſtains, and connects the new, tender, ſucceeding Fibres; and other *Balſams* act only in Imitation of this natural one, and are therefore the more valuable, the nearer they approach to this.

To make the Operation of external artificial Balſams effectual, the Wound ought to be but lightly covered with them, and the acrid, and ſuperfluous Pus to be very gently deterged, or elſe the new tender Fibres will be thereby deſtroyed. Internal Balſamics cannot be ſuppoſed to exert their Influence after this particular Manner; but as ſome of the former Claſs render the Fibres leſs apt to be irritated, theſe by ſheathing the Acrimony of the Humours leſſen the Irritation, by which Means the Veſſels about the wounded Part become more free, and pliable, and with greater Eaſe emit the new Veſſels, which re-unite the Wound.

Hence it appears, that ſuch Medicines ought to be eaſily *penetrating*, and *mild*; for if they are too viſcid, they promote new Obſtructions in the wounded Veſſels; if not mild, and ſoft, they excite, inſtead of allaying, a greater Heat: On this Account, hot, active Balſamics, ſuch as *Balſam. ſulph. aniſat. Peruv. e Mechâ, &c.* are pernicious in this Stage of a Conſumption, though uſeful when the Lungs are obſtructed, or loaded with cold, viſcid, or indigeſted, purulent Humours, where they attenuate, and promote a Diſcharge by *Expectoration*, and *Urine.*

Such a Management of the Non-naturals, is to be directed as is moſt agreeable to theſe Intentions. The Body muſt be kept as much as poſſible in the moſt convenient State of Reſt, even Speaking is improper, while the Wound is freſh, as the Lungs are particularly agitated by that muſcular Motion.

A MILK Diet, carefully directed, is preferable in this Caſe to any other, as it is of a cooling, ſoft, nouriſhing Nature, requires little Digeſtion, having been already prepared in the Stomach, and Bowels, and paſſed through the Lungs of the Animal from which it is taken, and conſiſts partly of its natural Humours, and the concocted Juices of Graſs, and other opening Herbs; by which Means it not only anſwers in every Reſpect the Intention required, as it is balſamic, and reſtrains too quick a Circulation, but ſeems ſpecifically to correct that *Acrimony* ſo peculiar to thoſe conſumptive Fluids; which appears to be of an *urinary, ſaline Nature*, ſuch as proceeds from a Mixture of *Salt-Ammoniac*: This is confirmed by the Taſte, the florid

Colour, and acrid Diſſolution of ſuch Fluids, which this Salt, and the marine Salt, by being mixed with the Blood can alone produce; and it is evident, from ſeveral Experiments, that ſuch an *Acrimony* is moſt effectually corrected by Juices which are of an *acceſent* Nature, tempered with ſomewhat *oleaginous.*

The Nature of Milk will greatly depend on the Diet, Strength, and Conſtitution of the Animal from which it is taken. The Milk of Animals living nearly on the ſame Diet, will be more thin, and light, in Proportion to the *Strength* of their *digeſtive Powers*, and leſs apt to *curdle*, or *ſeparate* into its component Parts, than when they are more weakly *united*: On which Account, Mare's and Aſs's Milk have been always preferred to Cow's Milk; and *Galen* very improperly directs boiling it to evaporate its watry Parts, and make it more nouriſhing,

riſhing, as it really becomes leſs ſo by the Loſs of its finer, and moſt uſeful Parts, and is leſs nouriſhing than when taken warm from the Animal without any Preparation: Aſſes Milk is apt to be more opening than Cow's Milk, as the Fibres of the former are ſtronger, and the ſaline, and oily Parts of the Milk are more active, and attenuated: On which Account, *Hippocrates* very often directed it in large Quantities, as a Purgative, ſometimes mixed with Honey, and in a Manner very different from that in which he recommends it as a Diet, or an alterative Medicine. Milk taken from the Breaſt of a Woman, is eſteemed more natural, and nouriſhing, than any other; but it is not only neceſſary, that ſhe ſhould be of a good Conſtitution, and live on a proper Diet, but that the Paſſions of the Mind ſhould be juſtly regulated; all which Circumſtances are more apt to be deficient in the rational, than the brute Creation.

It frequently happens, that though a Milk Diet has agreed very well with the Stomach, and Bowels for ſome Time, yet in its Courſe they are affected by it; in ſuch Caſes it is right to omit the Uſe of it for a Day or two, and to take a moderate Doſe of *Rhubarb*, or of the *Magneſia alba*. The Whites of new-laid Eggs are light, and leſs apt to ſtimulate, than any other Diet; therefore may make in this Caſe a very uſeful Part of Diet. *Hippocrates* * recommends them, as being very cooling; but was unacquainted with their alimentary Strength.

By this Method timely uſed, carefully purſued, and ſuited to the Strength of the Conſtitution, the Conſequences of an Hœmoptoe may be ſafely prevented. *Hippocrates* † gives a favourable Prognoſtic of an Hœmoptoe, when properly treated in the Beginning; but if Bleeding be neglected until (as he juſtly obſerves) the Veſſels are *relaxed*, and *widened* by a *large Diſcharge*, and a purulent Collection is formed, it proves generally fatal. Any Error committed either in Medicine, or Diet, is particularly dangerous in the firſt Stage of this Diſtemper; for whatever is mixed with the Blood, or taken for Nouriſhment, as it receives its chief Alteration from the Lungs, and arrives there almoſt unchanged, ought to be ſuch as wants ſcarce any other Preparation from them; and if it contains the leaſt *Acrimony*, or *Viſcidity*, by either *irritating*, or *obſtructing*, will be apt to renew the *Hæmoptoe*, and increaſe the Collection of purulent Matter.

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* *De Morb. L.* I. *S.* 5. † *De Int. Affect.*

When this Regimen has been continued for the Space of two Months, or until all Remains of a Cough, and other Symptoms diſappear, gentle Exerciſe, and particularly Riding in an open, dry Air, may be ſafely uſed, when the Stomach is moſt empty, in the Morning, and Afternoon; a greater Latitude in Diet is to be admitted by careful Degrees, always avoiding whatever may give too great an Acrimony, or Velocity to the Fluids. It will be likewiſe neceſſary every ſix Months, at the *vernal*, and *autumnal Æquinox*, to bleed, and to take ſome lenient Purgative; for at ſuch Times the Preſſure of the Air being more diminiſhed, the Humours are more apt to diſtend the Veſſels of the Lungs, and to bring on an Hœmoptoe.

An Hœmoptoe of the bronchial Arteries is not ſo dangerous as of the pulmonary Arteries, and is more eaſily cured by milder Evacuations, and the Uſe of a cooling, ſoft Regimen.

When an Hœmoptoe proceeds from preceding Obſtructions, the ſame Regimen is to be uſed, particular Regard being had to the original Cauſe of the Obſtructions.

SECT. V.

Of an Abſceſs, or Ulcer in the Lungs.

WHEN either from a Neglect of a proper Regimen, or from the Violence of of the Cauſes, a difficult Reſpiration ſucceeds *Obſtructions* in the Lungs, or an *Hæmoptoe* of the pulmonary Arteries, attended with a dry, laborious Cough, particularly after eating, or Motion, a hectic Fever, periodically increaſing towards the Evening, with a great Anxiety, Night-Sweats, eſpecially about the Neck, and Breaſt, great Thirſt, and an Oppreſſion which prevents lying on any but the affected Side; then theſe Symptoms plainly diſcover that a *latent Abſceſs* is formed in the Lungs, either from a Suppuration of the *obſtructed*, or *ruptured* Veſſels: In this laſt Caſe, an

Eſchar grows over the Wound, and the purulent Matter retained under it, gradually extends its Limits. In the Progreſs of this Diſtemper, the Symptoms grow more violent, the Body gradually waſtes, and the Feet at length ſwell, all the Humours degenerate into a purulent State, the Eyes become hollow, the Noſe ſharp, the Temples collapſed, the *Scapulæ* prominent like Wings, red Puſtules frequently appearing in ſeveral Parts of the Body: Theſe Symptoms are ſucceeded with an increaſing Weakneſs, and generally a fatal *Diarrhœa.*

An Abſceſs in the Lungs *terminates* variouſly *; ſometimes it continues *latent*, producing a gradual Decay; ſometimes † it breaks into the Cavity of the *Thorax*, or *Mediaſtinum*, producing an *Empyema** ; ſometimes its Diſcharge is ſudden, and violent into the *Trachæa*, and attended with an immediate Suffocation; but moſt frequently the Eruption is more moderate, and then becomes an *open Ulcer*, diſcharging by a Cough purulent Matter, whoſe Colour, and other Qualities are altered, according to the *Nature*, and *Duration* of the Abſceſs; ſometimes ſweet, or fetid, its Conſiſtence thin, and ichorous, or concocted; its Colour white, lateritious, yellow, livid, duſty, or variouſly tinged. The Symptoms in the Progreſs of this Diſtemper, are in every Reſpect the ſame as before-deſcribed, except that the Oppreſſion, and Difficulty of Breathing, are not ſo violent; neither is the hectic Fever ſo intenſe, and conſtant; the Lungs being often relieved from great Part of the purulent Matter by Expectoration, which in a latent Abſceſs had no other Way of being diſcharged out of the Body, but by being firſt abſorbed, and mixed with the Blood.

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* *Bonet Anatom. Practic. T.* I. *Lib.* 2. *Sect.* 7. *Obſ.* 38. *Obſ.* 74. *Tulpii. Lib.* 2. *Obſ.* 10. † *Bonet Anatom. Practic. T.* I. *Lib.* 2. *Sect.* 6. *Obſ.* 12. *S.* 7. *Obſ.* 12. *Obſ.* 20. *Obſ.* 29.

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* *Tulpii, Lib.* II. *Obſ.* 10. *Bonet Anatom. Practic. T.* I, *Lib.* 2, *S.* 2, *Obſ.* 11.

An *external* Wound, a *Perepneumony*, or a *Pleuriſy* not reſolved, but ending in a *Suppuration*, may likewiſe produce ſuch an *Abſceſs*; for in the laſt Caſe, the Lungs generally adhering to the inflamed Part of the *Pleura*, will be at length affected in the ſame Manner.

Abscesses formed in the Lungs, are attended with different Symptoms, and a different Progreſs, according to the *Cauſes*, *Seat*, and *Duration* of the collected Matter.

Abscesses formed from an *Hæmoptoe* of the *pulmonary* Arteries, generally terminate ſooner into an Opening into the Trachæa, than ſuch as have ſucceeded Obſtructions, the Part where the *Eſ-*

char was formed, more eaſily yielding to the Preſſure of the contained Matter.

Abscesses formed from an Hœmoptoe of the *bronchial* Arteries, are more quickly ſucceeded by a purulent Expectoration, than ſuch which proceed from previous *Obſtructions*; which by more ſlow Degrees, diſtend, and erode the Veſſels, and generally diſcharge purulent Matter, mixed with Phlegm; but in ſome Time their Progreſs becomes more rapid, as the pulmonary Veſſels, by being compreſſed, and eroded, muſt be affected in the ſame Manner.

Abscesses ſucceeding *acute* Inflammations in the Lungs, are more quick in their Progreſs, attended with more Pain, and a greater Degree of Fever, than ſuch as proceed from more *languid* Obſtructions; and when theſe are chiefly ſeated in the glandular Parts gradually enlarged, and diſtended, they ſometimes form *inciſted Abſceſſes*, which often ſhew but *obſcure* Symptoms before they ripen, break, and are diſcharged. Abſceſſes of this Kind may be juſtly termed the *Vomica Pulmonum*, variouſly deſcribed by different Authors, but without any particular Character to diſtinguiſh them by that Name, and ſeem to be of the ſame Nature with the ſuppurated *Tubercle* of *Hippocrates.*

THAT Side in which the Abſceſs is formed is more warm, and has a greater Senſe of Weight than the other. Lying on the contrary Side, often produces almoſt a Suffocation, the Cough, and Oppreſſion being thereby increaſed; but by lying on the affected Side, the Sleep is more undiſturbed, the Pus better concocted, and more eaſily expectorated.

WHOEVER reflects on the Nature of this purulent Matter, whoſe Acrimony perpetually increaſes, the great Quantity of Blood, and the Force with which it paſſes through the Lungs, the ſurpriſing Tenderneſs of their Fabric, all conducing to their eaſy Deſtruction; and that the moſt material Functions of Life depend on their Welfare, may evidently account for all the various Appearances, and Symptoms of this Diſtemper: Among which, none is more conſtant, and of more Conſequence, than the *hectic*, or *habitual* Fever, which attends phthiſical Perſons, from the Quantity of *purulent Matter* which is *abſorbed*, and received into the Blood; for when any Body, foreign, or acrimonious, is mixed with the Humours, a *Fever* is thence excited, by which it will either be *aſſimilated*, or *expelled*. *Sweats* are generally the critical Diſcharge, which Nature attempts in *putrid* Fevers, and will in phthiſical Perſons be moſt profuſe at *Night*, being then particularly determined there, by the

Warmth of the Bed, the Laxity of the Pores, and the great Diſſolution, and imperfect Mixture of their Humours; the Lungs being then incapable of giving them a proper Conſiſtence. The periodical Increaſe of it is moſt remarkable in the *Evening*, at which Time the firſt Digeſtion of the Food, taken for Dinner, being finiſhed, the *crude*, *viſcid* Chyle which enters the Blood, and ſoon arrives to the Lungs, is then particularly apt to *obſtruct*, and *inflame* the Extremities of the Veſſels, which open into the Abſceſs, or Ulcer; whence a Fever being excited, the obſtructed Parts are either *reſolved*, or with the Humours ſtagnating in the Cavity, reduced to *Pus*, which is the *natural Balſam* that can only connect the new ſucceeding Fibres; and as *Hippocrates* * obſerves, cannot be formed without a Fever.

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* *Lib.* II. *Aph.* 47.

By this periodical Fever therefore an immediate Suffocation from theſe new Obſtructions is in ſome Meaſure prevented, the *Pus* in the Cavity is concocted, and the Humours depurated by critical Sweats, diſcharging the purulent Matter abſorbed, and mixed with the Blood, and then the Fever ceaſes; but whenever there is a ſufficient freſh Collection, or new Obſtructions are formed, it returns again, and gives the ſame Aſſiſtance as before. Thus, by this unavailing Attempt of Nature, the Patient is ſucceſſively oppreſſed, and relieved, and gradually waſtes away. Hence at length the *Legs*, and *Hands* begin to *ſwell*, the Force of Circulation being more languid, and not ſufficient to propel the Humours with ſufficient Force through the Veſſels, which are at the greateſt Diſtance from the Heart. The *Thirſt*, *Loſs of Appetite*, *Falling of the Hair*, *red Puſtules*, and all the other Symptoms may be eaſily deduced from the univerſal *Acrimony*, and *putrid Diſpoſition* of the Humours; which at length degenerating into a purulent State, and not having a ſufficient Force given to determine them to the Surface of the Body, are conveyed through the *meſenteric*, and *cæliac* Veſſels, obſtruct, and frequently exulcerate them, become more fetid, and acrid, and thence irritate, and determine the Courſe of the remaining circulating Humours chiefly to theſe Parts; by which Means Expectoration is ſoon ſuppreſſed, and a fatal *Diarrhea* cloſes the Scene.

THAT Phthiſis which is *hereditary*, and preceded by an *Hœmoptoe*, is generally fatal; ſuch Conſtitutions can only be preſerved by ſuch a Regimen, as may prevent an Hœmoptoe, or its Progreſs to a Suppuration; whereas a Phthiſis, which ſucceeds an Hœmoptoe, from a ſudden, violent Motion given to the Blood, or from an external Wound, where the Fluids, and Solids are well diſpoſed, is more eaſily cured.

That Phthiſis is particularly dangerous, which ſucceeds a Suppreſſion of the *Menſtrua* in Women, and cannot by any Means be relieved, until that natural Diſcharge is reſtored; neither can the Progreſs of a Phthiſis, from a Suppreſſion of the *Hæmorrhoids*, be ſafely prevented, but by reſtoring that natural Evacuation, or by an Aperture of them.

That Phthiſis which proceeds from preceding Obſtructions, or from acute Inflammations of the pulmonary Arteries, is curable, if the Abſceſs breaks ſoon, and freely diſcharges by Expectoration purulent Matter, of a white Colour, well-digeſted, of an equal Conſiſtence, and free from Putrefaction, if the Fever, and Difficulty in Breathing gradually abate, if the Diſcharges of the Body are natural, and regular; but if the Fever ſtill continues, or returns periodically in a violent Manner, if the Appetite languiſhes, and the Thirſt increaſes, if the Matter expectorated be of a pale, aſh Colour, or of a green, or livid Colour, diſſolved, and not concocted, the Caſe is then moſt deſperate.

THAT Phthiſis which is attended with a Diſtention, or Hardneſs of the *Hypochondria*, is particularly dangerous, as they ſhew a Defect in the chylopoietic Organs, and an Inaptitude to repair the great Decays, which are the conſtant Effects of this Diſtemper.

WHEN an Abſceſs is formed, the Indication is to *ripen* it, and to *determine* the Rupture of it into the *Trachæa Arteria.*

Unless the Abſceſs is duly *ripened*, the Aperture will be but *ſmall*, and incapable of diſcharging freely the purulent Matter. It will then unavoidably degenerate into a *fiſtulous Ulcer*; and unleſs the Rupture is determined externally, it will form an *Empyema*.

An Abſceſs will more quickly, and eaſily be *maturated*, by a ſoft, relaxing Diet, and by macerating theſe Parts with the *Vapour* of emollient Herbs, and afterwards *irritating* them with active, ſtimulating Vapours, or by giving a gentle Vomit of *Oxymel Scilliticum*, and *Ol. Amydal. dulc.* by which Means it will probably break externally into thoſe Parts, whoſe *Reſiſtance* has been *weakened*, and which have been *irritated* to a Diſcharge.

When an Ulcer is formed, the Indications are to *cleanſe*, and *heal* it.

No Ulcer can poſſibly be healed, unleſs it is capable of diſcharging *freely*, and *regularly* the ſuperfluous purulent Matter; which otherwiſe, by ſtagnating, and acquiring a greater Degree of Acrimony, will erode, and form *fiſtulous Sinuſſes*; and the moſt powerful, expectorating Medicines will not avail, where the *Seat* of the Ulcer, and *Nature* of the *Aperture*, muſt always prevent it from being regularly *cleanſed*, and *diſcharged*. This is one of the principal Difficulties which attends an Ulcer in the Lungs.

When an Ulcer is favourably *ſituated*, and *opened*, the *Cough* is the Inſtrument which Nature always makes Uſe of to cleanſe it, and to diſcharge the ſuperfluous purulent Matter, and is to be encouraged, or moderated by ſuch Medicines as are ſuited to the Conſiſtence of it.

Though an Ulcer in the Lungs is ſufficiently *opened*, and the Cough juſtly equal to the Quantity to be diſcharged, yet it can never be healed while the *Fluids* in general are *vitiated,* and *depraved,* and the Humours ſeparated into the ulcerated Cavity are incapable of forming laudable *Pus,* which can only properly *ſuſtain,* and *unite* the new Fibres; and when depraved, will *erode* them, and *enlarge* the Limits of the Ulcer; and hence ariſes another great Difficulty which attends an Ulcer in the Lungs.

When all theſe Circumſtances are favourable, another Difficulty which often prevents the healing of an Ulcer in the Lungs, is the Want of ſufficient *Reſt,* in an Organ ſucceſſively *enlarged,* and *contracted* by Reſpiration; but this is often prevented by an *Adheſion* of the Parts affected to the *Pleura*; and I am well convinced, that Ulcers in the Lungs, except ſome ſmall ones in the bronchial Glands, are never cured by *internal* Medicines,

dicines, unleſs *confined,* and kept more in a State of *Reſt*, by ſuch an *Adheſion.*

The moſt *active, cleanſing,* or *expectorating* Medicines are chiefly uſeful in the *Beginning*, to *diſcharge entirely* the collected Matter, which firſt formed the Abſceſs, and which by long Stagnation, uſually has acquired a conſiderable Degree of Acrimony, and Putrefaction; afterwards others of a *milder* Nature, and ſuch as are only ſufficient to diſcharge the *ſuperfluous*, acrid, purulent Matter, which is dayly formed, and collected: On which Account, the Intentions of cleanſing, and healing, are then to be *inſeparably* purſued; for if the former are too active, and irritating, they will not only *enlarge* the Ulcer, but prevent the purulent Matter from acquiring that *Conſiſtence,* which is neceſſary to a Reunion of new Fibres.

STIMULATING Vapours, and Preparations of Squills, either in ſuch repeated Quantities as to promote Expectoration, or as an *Emetic*, are the moſt powerful of this Claſs; but are ſeldom neceſſary when the Ulcer is ſucffiiently opened: Preparations of the Gums, *Ammoniacum, Galbanum, Opoponax, Aſa fœtida*, and the native Balſams, are more mildly deterſive, and may be made more effectual by Decoctions, or Infuſions of Plants of the ſame Claſs, among which, the following deſerve a principal Place, *Fol. Veronicæ, mar. Hyſſopi, Marrubii, Virgæ Aureæ, Scorbii, ſcabioſæ, Pulegii, Valerianæ hortenſis, Flores Centauri min. Radices Eryngii, Fœniculi, Petroſelini,* with Preparations of *Honey*.

WHEN the Matter is laudable, and the Expectoration free and regular; the Intention of *Healing* is to be purſued by the Uſe of *balſamic* Medicines, whoſe Operation conſiſts in giving the Veſſels a Diſpoſition to *emit,* and unite the new Fibres, and in correcting the *Acrimony* of the Humours, and guarding them from Putrefacton: Such therefore ought to be *light,* and *aperient,* and more apt to prevent, than to form *new Obſtructions* about the *ulcerated* Parts, which being afterwards *inflamed,* and *ſuppurated,* muſt enlarge the Limits of the Ulcer.

AMONG this Claſs the following vulnerary Plants deſerve a principal Regard, *Fol. Tuſſilaginis, Capil. Veneris, Agrimoniæ Betonicæ, Flores pur. recentes Betonicæ, Verbaſci, Hyperici, Altheæ, Radices Glycyrrhizæ, &c.* Theſe are beſt given in *Infuſion,* ſweetened with Honey, becauſe in no other Form they can ſo eaſily paſs through the Veſſels, and communicate their Virtues to the Blood.

THE Effects of theſe, may at the ſame Time be promoted by Preparations of the following balſamic Gums, *Myrrha Olibanum*, *Maſtiche*, with *Terebinthina nativa*, and *Balſamus e Mechâ*; to which the Extract of the *Cortex peruvianus* may be uſefully added, when the Quantity of *Pus* collected, and diſcharged, has been gradually diminiſhed.

DURING this Courſe, the frequent Uſe of anodyne Medicines, ſuch as *Syrupus Papaveris alb.* or *Pil. de Styrace*, are of the greateſt Service, taken going to Reſt, at an early Hour. How far Sleep contributes to the general Nouriſhment of the Body, gives Strength to the Solids, and preſerves a due Texture in the Fluids, has been already ſhewn. But in this Stage of this Diſorder, it is farther neceſſary to allay the uneaſy Irritations which excite the Cough, and to give Reſt to the weak, and wearied Lungs; without which the purulent Matter cannot acquire that balſamic Conſiſtence, which is ſo neceſſary to the Re-union of the Veſſels; for by theſe Means, what is expectorated next Morning, will become mild, and digeſted, which otherwiſe would be more thin, and acrid.

THESE are the general Rules which ſeem to be beſt ſuited to the Intentions of *cleanſing*, and *healing* Ulcers in the Lungs, when from their Circumſtances, and Situation they will admit of a Cure by *internal* Medicines; which, however, are to be often varied, according to the Conſtitution, and different Cauſes which originally produced this Diſtemper; for *vulnerary* Medicines only deſerve that Name, when they correct that prevailing *Acrimony*, or *Viſcidity* in the Fluids, which is peculiar to ſuch Conſtitutions. Thus *Lime-Water* may be the beſt *vulnerary* in Ulcers originally owing to *Catarrhs*, eſpecially in a *ſcrophulous* Habit of Body, and more warm Pectorals are then neceſſary to promote a due Expectoration; while the mildeſt attenuating, and ſofteſt Medicines, ſuch as have been recommended, are moſt proper for that State of the Fluids, and of the purulent Matter which attends Ulcers owing to an *Hæmoptoe*, or previous *acute* Diſeaſes.

THE Nouriſhment which is chiefly proper in this Stage of a Phthiſis, ought to be light, cooling, and oppoſite to *Putrefaction*: On which Account, Preparations of the *vegetable*, are preferable to thoſe of the *animal* Kind; which more eaſily acquire this Diſpoſition when received into conſumptive Bodies, where the Heat is often very intenſe, the Humours inclined to Putrefaction, and ſome of them actually putrid; for the purulent Matter expectorated, is generally of that Nature, or when thrown on hot Coals, quickly becomes ſo; whatever therefore increaſes the Heat, will increaſe the Putrefaction.

A MILK Diet taken in the ſame Manner in which it has been recommended in an Hœmoptoe, anſwers the chief dietical Intentions, required in this Stage of a Phthiſis; being of an aceſcent Nature, eaſily aſſimilated, and moſt fit to repair the Decays of conſumptive Bodies, and to recruit their exhauſted Spirits; for no Parts are more plentifully ſupplied with *Nerves* than the *Breaſt*; and as they are not expended on muſcular Motion, are moſt probably diſtributed there to impregnate the Milk ſeparated, and lodged in their Tubes, with a large Proportion of *animal Spirits*: On which Account, it more effectually anſwers theſe Purpoſes, when taken in its natural Warmth, immediately from the Animal; for by long Standing, or any artificial Heat given to it, the finer, and more ſubtle Parts evaporate.

BREAD well-baked, and particularly Biſcuit, ſome of the vegetable Grains, Fruits, and ſoft Roots prepared by boiling, or baking, afford a Variety of grateful, and uſeful Nouriſhment in theſe Caſes. In Ulcers from Catarrhs, and particularly of the glandular Kind, where the Conſtitution is originally low, and relaxed, a *warmer Regimen* is neceſſary, ſuch as the light animal Meats, well-roaſted, with a moderate Quantity of *Canary*, or ſome other generous Wine diluted with Water; without which the purulent Matter will never be well *digeſted*, or eaſily expectorated. Milk in large Quantities is apt to diſagree with them, and becomes more uſeful when a ſmall Quantity of Brandy is added to it, or when diluted with a fourth Part of Lime-Water.

These are the general Rules of Diet in this Stage of Phthiſis, which often require to be varied according to particular Circumſtances; for that Diet which is diſagreeable to the Patient, though directed from right Principles, will never give Strength, or repair conſumptive Bodies; whenever therefore the conſtant Uſe of Milk, or of vegetable Preparations becomes diſagreeable, the lighter animal Foods muſt be allowed, if more agreeable to the Appetite, with Wine in a very moderate Quantity; which, as an *Antiſeptic*, will correct the animal Food, the putrid Diſpoſition in the Fluids, and ſtrengthen the Digeſtions: On which Account, *Hippocrates* generally directs it more freely in this Stage of a Phthiſis; but the Degree of Fever, and other Circumſtances, will beſt determine the Quantity, which if not carefully attended to, may *inflame*, and *enlarge* the Ulcer; and the great Difficulty in directing a proper Diet in theſe Caſes, ariſes from the *oppoſite* Indications, to which it muſt in ſome Meaſure be ſuited; for as the Lungs are the principal Organ of the ſecond Digeſtion, when they are weak, and their Action is deficient, the Humours become more *diſſolved*, and eaſily flow away by profuſe waſting Sweats, eſpecially when large Quantities of Liquids are taken; which may in a great Meaſure be prevented by a more ſolid Food, and Wine; but a Diſpoſition in the Veſſels about the ulcerated Parts to be eaſily inflamed, makes this Regimen often unſafe.

THE Shirt, and Bed-Linen, ought always to be carefully dried before going to Reſt; for being generally damped by theRemains of former Sweats, which by ſtagnating, acquire a greater Acrimony, and being eaſily raiſed by the Heat of the Body, compoſe a moiſt, putrid Atmoſphere, which greatly contributes to their Uneaſineſs, and to the Increaſe of the nocturnal Sweats.

EXERCISE in a *free, dry* Air, eſpecially Riding, greatly contributes to make this Regimen more effectual: It promotes a more eaſy Expectoration, and by giving a more *denſe,* and *united* Conſiſtence to the Blood, prevents in a great Meaſure the Night-Sweats.

SOME Authors, have eſteemed an Ulcer in the Lungs incurable, while others running into a contrary Error, and depending on the Virtues of particular Medicines, ſeem not ſufficiently ſenſible of the Danger which attends it. The Rules which have been here given, point out ſome Difficulties which are inſuperable; and ſeem moſt proper to obviate the Difficulties attending ſuch which are more favourable; and I know many Inſtances of Perſons (ſome now living) who have been cured by a careful Purſuit of them; of which I ſhall give a few Inſtances.

A Lady was ſeized in the Morning with a Pain in the right Side. She was immediately blooded: I viſited her in a few Hours afterwards; her Pulſe was then ſoft, and not much quickned, her Cough frequent, but moderate, what ſhe expectorated appeared to be *purulent*, and of a *lateritious* Colour: On enquiring, I found that ſhe had often complained of a Pain in that Side, which was attended ſometimes with a light Cough: About two Months afterwards the Pain became more uneaſy, and conſtant, but never confined her; and from that Time until this Day, ſhe had been more free from it. The Expectoration was ſoon more free, and copious, and in a few Hours ſhe diſcharged about twelve Ounces of that Sort of purulent Matter, and about the ſame Quantity every twenty-four Hours, for the ſeven or eight ſucceeding Days, but with a more moderate, and leſs frequent Cough. This

Expectoration continued regular, but gradually became more white, digeſted, and leſs in Quantity. She was free from any great Degree of Fever, and that intermitting: She ſlept well by the Uſe of Anodynes; and by purſuing a cleanſing, and healing Regimen of Diet, and Medicines, in about ſix Weeks Time ſhe was perfectly well, went into the Country, drank Milk Morning and Evening, and acquired Fleſh, and Strength. In about a Month afterwards, the Pain in the Side, and the ſame Diſcharge returned; ſhe came in a Wheel-Carriage to Town; the Diſcharge was more plentiful than before, and continued ſo for a Fortnight; then gradually leſſened in the ſame Manner as formerly: She never had any Return, and was entirely free from a Cough, except on taking Cold. This Lady was afterwards much afflicted with the Gout, and Rheumatiſm. The Loſs of her Limbs confined her to her Bed for the two laſt Years of her Life. I viſited her in the Year 1740, and ſhe died in 1756. It is not improbable but that the Gout, and Rheumatiſm, tho' it made her Life miſerable, prevented the Return of this Diſorder.

A YOUNG Gentleman in the Army, became hectic after a Pleuriſy, and was much reduced: He was brought from *Kinſale* to *Cork* in a Litter; the next Night an Abſceſs that was formed broke, and he diſcharged by Coughing in twenty-four Hours about fourteen Ounces of purulent Matter, the Diſcharge continued very copious for ſeveral Days; he ſlept well by the Uſe of Anodynes; the Cough was moderate, and the Expectoration free, and gradually, but ſlowly diminiſhed. I adviſed him to return to his native Air at *Richmond,* where his Father lived, and recommended him to the Care of Dr. *Meade*; and if the Diſorder

order continued obſtinate, propoſed opening the Side. He was detained for three Weeks by contrary Winds, in which Time he daily recovered Strength; and by the Time he came to *Richmond*, his Cough, and Diſcharge had almoſt left him: He conſulted the Doctor, who gave me an Account, that he was ſurprized to ſee a Caſe that had been attended with ſuch Symptoms, end in ſo favourable a Manner; and that he had no Occaſion to order any Thing but a common *pectoral Linctus*, and to continue his Milk Diet; that had the Diſorder proved obſtinate, he thought that the Operation propoſed, was the probable Means of curing him. I viſited this Gentleman in the Year 1732, and was agreeably ſurpriſed to meet him in *Dublin* in 1749. He told me, that he had continued ſince well; but that he was ſometimes aſthmatic on a Change of Weather or on taking Cold.

It is very remarkable, that in each of theſe Caſes, the Expectoration was free, and copious in the Beginning, continued ſo, and gradually leſſened; and that the Aperture from the Abſceſs was therefore *large*. *Hippocrates* *, with his uſual Sagacity, mentions all theſe Circumſtances as neceſſary to a Recovery: *If the Tubercle in the Lungs ripens well, breaks upwards, and diſcharges entirely the purulent Matter; and if the Cavity* (Κοιλὶη) *in which it was contained, contracts, and conſolidates, then Health ſucceeds.*

When an Ulcer in the Lungs, from its *Situation*, and *ſmall* Aperture, cannot be cleanſed, the Symptoms increaſe, and elude the Force of internal Medicines; inſtead of amuſing the Patient with deluſive Hopes, and the repeated Uſe of palliative Medicines, or denouncing certain Death, it would be of the greateſt Uſe, if a Method could be propoſed, which though dubious, and ſomewhat painful in the Operation, may carry ſome Proſpect of Relief.

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* *De Morb. L.* I. *S.* 5.

WHEN evident external Marks appear in the Sides, all Authors, antient, and modern, agree, that an *Aperture* ſhould be made; and Books of Obſervation abound with Inſtances of this Kind, where it has been performed with Succeſs. *Hippocrates* * conſtantly directs it either with the *Knife*, or *actual Cautery*, not only when any *external* Appearances are evident, but where they are very *obſcure*; and ſeldom ſeems to doubt of Succeſs, but in very advanced Caſes, where the Fluids in general, and the purulent Matter collected, are degenerated into a putrid eroding State, and where, though a free Diſcharge is given, yet the Ulcer can never heal.

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* *De Affect.* S. V.

IT appears from the Diſſection [*] of thoſe who have died of this Diſtemper, that ſuch Abſceſſes, or Ulcers in the Lungs, generally *adhere* by a large Surface to the *Pleura*; that when this Membrane has not *originally* been engaged with an *Inflammation*, and afterwards *ſuppurated*, it is greatly *thickned*, and *hardned*; that *purulent Matter* is always *contained* under that *indurated* Part; that Ulcers of this Kind have been generally *fiſtulous*: Theſe from their *Nature*, and *Situation* are therefore incapable of being cured by *internal* Medicines.

HENCE it is evident, that no *external* Tumour, and Suppuration, can be expected to direct this Operation, but where the Pleura, and Lungs in the adhering Parts are *both* ſuppurated; and that when the Pleura is thus *indurated,* and its *Reſiſtance* increaſed, the Ulcer muſt enlarge its Bounds on the Lungs, where it is more *diminiſhed.* The Situation of it therefore can then only be determined by the *Pain* which originally, and chiefly affected that Part, by a Weight remaining, and ſometimes by a ſenſible Enlargement of the Ribs riſing into an higher Arch.

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[*] *Bonet Theat. tabid. Exercit.* 16. *Fernel. Conſil.* 20. *Willis Pharmaceut. Rat. Sect.* I. *Cap.* 10. *Carol. Piſoe de Colluvie, Seroſ. Sect.* III. *Cap. Ultimum. Tulp. Lib.* II. *Obſ.* 4. *Bonet. Anatom. Practic. Tom* I. *Lib.* 2. *Sect.* IV. *Obſ.* 9. *Sect.* V. *Obſ.* 2. *Sect.* VII. *Obſ.* 38, *et* 39.

BY this Adheſion of the Lungs to the Pleura, the Parts affected are kept (as if carefully deſigned by Nature) in a great Meaſure in a State of Reſt, and eaſily admit an Opening into the Cavity; neither if the Operation fails, can it be attended with any great Danger, or much accelerate the Progreſs of the Diſtemper: There is one material Circumſtance which may direct the Operator, which is a greater Reſiſtance than uſual to the Knife from the *Induration,* and *Thickneſs* of the Pleura, which always attends ſuch Caſes, except they are very recent. This may then be conſidered as a *certain external* Mark of the *Seat* of the Ulcer: He may then ſafely advance, and if other Circumſtances are favourable, a Recovery may be expected.

THE Succeſs which ſometimes has attended the Operation of the *Empyema*, confirms the Uſefulneſs of this Practice; by which the extravaſated Matter contained in the *Cavity* of the *Thorax*, is *only* diſcharged; not from the *Cavity* (or Κοιλὶη, as *Hippocrates* terms it) of the *Ulcer*, for this muſt *heal*, and *conſolidate*, or the Operation can give only a temporary Relief; but whenever ſuch *Collections* break inwardly, the *Gravity* of the Matter determines the Aperture to the *depending* Part, and with ſuch a *Force* as to make it ſufficiently wide to *cleanſe* entirely, and to receive that Diſpoſition which is neceſſary to healing; and it is only indeed in ſuch Caſes that the Operation for an *Empyema* ſucceeds: But when the Operation here recommended, is *timely* performed, an Empyema will be *prevented*, and the new artificial Aperture will ſupply the Place of the ineffectual Opening into the Trachæa, and diſcharge the purulent Matter, without the Inconveniencies which attend Expectoration, while the Ulcer may be more eaſily cured by deterging, and healing *Injections*.

Hence it appears, that an *Empyema* is not an *original* Diſeaſe, but the Conſequence of an Abſceſs formed in the Lungs, or *adhering Pleura*; and why, on the firſt Diſcharge, as *Hippocrates* * obſerves, the Oppreſſion, and other Symptoms abate? as the Matter confined in a cloſe Cyſtis is then diffuſed into a larger Space; which in its Progreſs by its increaſing Quantity, and Preſſure on the

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* *Lib. de Morb. S. V.*

Diaphragm, and Lungs, and by ſtagnating, acquires a greater Degree of Putrefaction, and muſt, though the original Ulcer is well cleanſed, renew, and increaſe the former Symptoms, and univerſal Decay, unleſs it is diſcharged. *Hippocrates* * was well acquainted with this Operation, and particularly directs the Aperture to be made in a depending Part; but ſo high, as to avoid wounding the *Diaphragm*; which has not been ſufficiently attended to by other Writers on this Subject, who have directed it between the eighth and ninth, and others between the ninth and tenth Rib: The ingenious Mr. *Sharp* †, has deſcribed this Operation with a peculiar Accuracy, and has added all the Cautions, which are neceſſary to make it ſafe, and effectual.

If this Operation is timely, and judiciouſly performed, many Perſons may be preſerved, who muſt otherwiſe unavoidably die: Some Difficulties muſt always attend, and often prevent it; Phyſicians will be apt prudently to avoid directing an uncertain Operation, and liable to Cenſure if it fails of Succeſs; eſpecially when the Diſeaſe is recent, and other Symptoms favourable; and yet that is really the only proper Time both in this Caſe, and in an Empyema; but is generally deferred until the Strength is waſted, and the Humours become putrid, and acrid; the Return of Eaſe, which ſucceſſively follows the oppreſſing Anxiety, and hectic Fever, gives flattering Hopes of a Recovery, and will often make the Patient more unwilling to ſubmit to it.

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* *De Morbis, Lib.* II. † *Operations in Surgery, C.* 24.

The Symptoms which forbid this Operation, either in an Empyema, or in an enciſted Abſceſs, or Ulcer, and the Prognoſtics are equally the ſame; for where the Strength is waſted, and the *Pus* not well digeſted, and of an equal Conſiſtence, but acrid, thin, fetid, and ill-coloured, it can be of no Service; but theſe Prognoſtics may be more eaſily formed in this Caſe before the Operation, as the Nature of the purulent Matter contained in the Ulcer, is evident from what is expectorated; which in an Empyema cannot often be diſcovered until the Operation has been made.

THAT Abſceſſes, and Ulcers in the Lungs may be thus artificially diſcharged, is not only agreeable to the ſtricteſt Reaſoning, but has been confirmed by Experience: I ſhall mention a few Obſervations of others, and of my own, which more ſtrictly point out the Uſefulneſs of this Operation.

A SOLDIER * received a Wound with a Sword, penetrating through the Ribs into the Cavity of the Breaſt, from whence

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* *Miſcellanea Curioſ. An.* VI. *Obſ.* 41.

a ſmall Quantity of Blood was externally diſcharged. The Surgeon who attended him, quickly healed the Wound; this was ſucceeded with a Cough, hectic Fever, and a difficult Reſpiration: Theſe Symptoms were particularly violent in the Night; at length he expectorated a conſiderable Quantity of purulent Matter. In this decaying Condition, he remained for ſome Time, until the wounded Part was again opened by Inciſion, which immediately diſcharged a large Quantity of purulent Matter. The Cough, hectic Fever, and Difficulty of Breathing, ſoon abated; and by the Uſe of a proper Regimen, he was reſtored to perfect Health.

It is moſt certain, that the Lungs of this Perſon were ulcerated, and *adhered* in that Part to the *Pleura*; and that he muſt have languiſhed away, if not relieved by the Diſcharge from the new

Wound. And though the Aperture was evidently pointed out in this Caſe, by the Symptoms ſucceeding the healing of the Wound ; yet when there is ſuch an Adheſion from an Abſceſs, or Ulcer, proceeding from an *internal* Cauſe, there is almoſt equal Reaſon to expect Succeſs, if it is properly made ; the only Difference is, that the purulent Collection in the former Caſe proceeded from an external Wound, with a good Habit of Body ; in the latter, from an internal Cauſe, and originally owing to a vitiated State of the Humours, which may by a proper Regimen be corrected.

A YOUNG Gentleman of twenty Years of Age, was ſeized with a Pain in his left Side, which continued for ſome Days, and from ſome Circumſtances attending it, was miſtaken for an Ague : Bleeding in a ſufficient Quantity was neglected ; he became hectic, and expectorated purulent Matter: The Cough was frequent, the Expectoration difficult, and not *equal* to the Load which oppreſſed him. In this State I ſaw him, and recommended the Operation in that *Part* of his Side where he had been formerly affected with *Pain*. It was performed by *Inciſion*, and diſcharged about ſix Ounces of purulent Matter: The Diſcharge continued regular for ſeveral Days, but was with ſome Difficulty promoted by a ſtrong Inſpiration, and Coughing, and then flowed at the different Efforts which he made, like Wine out of a Hogſhead which has not a ſufficient Vent; this became more eaſy, and effectual by the Uſe of Injections. The Expectoration, and Diſcharge, continued for about ſix Weeks, but gradually leſſened: The Cough, and other Symptoms abated, and in about two Months Time he was perfectly recovered. I viſited this Gentleman in the Year 1726: His Caſe was again laid before me in the Year 1754; he had then lately recovered from a pleuritic Diſorder, and was afraid of the ſame Conſequences which formerly attended it.

WITHIN theſe three Years Mr. *Tucky*, an eminent Surgeon, performed this Operation by my Direction on two Soldiers in the Royal Infirmary in *Dublin*, who had ſcarce any external Marks to determine the Seat of the Ulcer, but the former Pain; from each there was a free and regular Diſcharge of purulent Matter, and both recovered. In one of them he was obliged by his Obſtinacy to deſiſt from the Operation, but at his own Requeſt it was finiſhed the next Day.

A PERSON about forty Years of Age, naturally of a ſtrong Conſtitution, well-proportioned, who uſed much Exerciſe, lived freely, and from his Situation was obliged to ſpeak much in public Aſſemblies, complained for ſome Time of a Pain in his right Side, which he neglected, and afterwards treated in a very ſlight Manner. The Pain gradually abated, yet he did not recover his Strength, but became low-ſpirited, and oppreſſed on Walking; his Cough was very moderate, and his Breathing free. He had continued in this Manner about ſix Weeks before I viſited him, which was the 17th of *October*, 1727; he then complained of light Shiverings, ſoon grew hot, was in a high Fever, his Pulſe ſoft, and quick, his Cough frequent, and unattended with any Expectoration; he was blooded freely, but without any Relief: The Fever, and Cough continued until the 24th, when by a violent Fit of Coughing, he diſcharged about ſix Ounces of purulent Matter, of a ſweet, and diſagreeable Taſte, but not fetid: He continued to expectorate every Day at different Intervals, and with a moderate Cough, purulent Matter, the Quantity gradually leſſened, and what was at firſt yellow, became tinctured with a lateritious Colour; all the Symptoms abated, and he recovered a conſiderable Degree of Strength: About ten Days after this State of Freedom, and Eaſe, the Fever returned, preceded by light Shiverings, and an increaſed Cough: He expectorated the ſame yellow, purulent Matter, but in a leſs Quantity: The Symptoms became more favourable, and gave flattering Hopes that the Ulcer had been entirely cleanſed, and healed; but this Relief was again always ſucceeded with a new Collection, and Expectoration, and preceded by hectic Heats, and an increaſed Difficulty of Breathing; at which Time he often complained of an obtuſe Pain in his Side, extending to the *Clavicle.* Theſe expectorating Paroxyſms, frequently returned at the Diſtance of about ten, and at other Times fourteen Days; and after each, the Cough, and Breathing became eaſy, and his Pulſe temperate: He reſted well, and his Strength increaſed.

This was the Progreſs until the 28th of December, when the Diſcharge of purulent Matter entirely ceaſed; but the hectic Fever, and Difficulty of Breathing increaſed; and in about ten Days after he had a violent *aſthmatic* Paroxyſm, in which he was reduced to the greateſt Weakneſs; during which he expectorated a conſiderable Quantity of very viſcid Phlegm. This aſthmatic Paroxyſm, returned two or three Times in a Week, until the Second of *February*, at which Time the Abſceſs broke again, and he diſcharged yellow, purulent Matter, of a ſweet Taſte, which ſoon changed its Colour, and aſſumed the ſame Appearances as before.

For ſome Days the Expectoration continued free, and eaſy; but as it decreaſed, the hectic, and Difficulty of Breathing increaſed. The aſthmatic Fits at length more frequently returned, and afterwards went off by a *ſmall* Expectoration of purulent Matter. He died in one of theſe Fits on the 26th of February, which was attended with a ſmall Hœmoptoe, his Pulſe gradually languiſhing, and his Senſes continuing perfect to the laſt Moment.

Towards the End of *November*, I propoſed to have an Aperture made in his Side, as I was convinced from the frequent Collection of the purulent Matter, and his *imperfect* difficult Expectoration, that the Ulcer could never thence be effectually *cleanſed*, and at which Time his Strength was very conſiderable; but he was eaſily prevailed on to think, that his Caſe was not ſo dangerous, as to make it neceſſary. However, the obſtinate Progreſs, and Increaſe of the Symptoms, and the concurring Advice of his Phyſicians, determined him to ſubmit to it in the Beginning of *January*: The Succeſs which attended this Operation in the former Caſe, with which he was well acquainted, was no ſmall Motive to induce him to conſent to it.

Mr. *Oſborne*, a very worthy and eminent Surgeon, performed the Operation. He found the Pleura ſo much *indurated*, that with Difficulty he entered the Knife, and ſo *incraſſated*, that he had paſſed it a Quarter of an Inch, and ſtill found a Reſiſtance; this made the Operation more painful, and tedious than was expected; he grew faint, and begged that the remaining Part might be deferred until the next Day. Next Morning a Letter from *Dublin* mentioned, that an eminent Phyſician was ſent down from thence by his Father, and as his Arrival was expected in two Days, the Operation was deferred until he came: After we had carefully conſidered the Progreſs, and Circumſtances of this Caſe, we were all of Opinion, that the Operation was the moſt probable Method of reſtoring him; and when he had heard our Opinion, he aſked this laſt Phyſician, whether he thought it was poſſible for him to recover by any other Means? He ſaid, he might poſſibly recover without it. Thus encouraged, he determined not to have the Operation purſued. In a few Days afterwards viſiting him in the Morning, he told me, that he had reſted well; and hoped, that I would think he was much better. I was ſilent; but on his repeating the Queſtion, I told him, that my Regard for his Safety, prevented me from fixing any Dependance but on the Operation. He then ſaid, that he was ſatisfied to die; and expreſſed ſuch an

Averſion to any farther Operation, that he immediately directed a Friend of his, who was preſent, to take Care that his Body ſhould not be opened; and gave him ſome Directions to have his Funeral performed in a private Manner.

AFTERWARDS the Wound was ſuffered to heal, and in a few Days was reduced to a ſuperficial Ulcer, but about three Days before he died, it opened again; the upper Part ſeparated from the Rib, and it diſcharged a much greater Quantity of purulent Matter than it had ever done before; from whence it appears very probable, that in the firſt Operation, the Knife had penetrated very near the Cavity, and perhaps into it; but the Pleura was hard, and ſo *inſenſible* as not to *recede* when divided; and in that indurated State of the Pleura, a *Perforation*, and a farther *Digeſtion* were probably neceſſary to give a ſufficient Diſcharge to the *viſcid*, purulent Matter.

He could never lie on the oppoſite Side when the Abſceſs was cloſed, without the Cough, and Difficulty of Breathing being greatly increaſed; and when he attemped that Poſture while he had a free Expectoration, the purulent Matter flowed ſometimes ſo faſt, as to threaten a Suffocation; at other Times he could lie more eaſy on that Side: The Reaſon of this was evident from the Situation of the Ulcer, as the collected Matter was then by its own Gravity determined more to the Aperture into the Trachæa. The Matter diſcharged was never fetid; he always expectorated with the greater Freedom lying *ſupine* on the affected Side, than in an *erect* Poſture: This Difference was ſo very remarkable, that towards the End of an expectorating Paroxyſm, when he could not bring up in an erect Poſture any Thing but *viſcid* Phlegm, on lying down, he immediately diſcharged the *purulent*, *lateritious* Matter;

ter; which he always by its Taſte diſtinguiſhed, before he ſaw it. This evidently ſhews, that its Situation was in the *loweſt Part* of the *right Lobe,* with a large *Adheſion* to the *Pleura,* and probably to the *Diaphragm*; in which State, the Lungs can have but little expelling Force from their *own Contraction,* and receive it chiefly from the Action of the *Muſcles* of the *Thorax,* and *Diaphragm*; which in that Situation, from the Matter giving a leſs *Reſiſtance* by its *Gravity,* may more eaſily be diſcharged; and whenevever purulent Matter is more freely expectorated in this *ſupine* Situation, it may be conſidered as a *certain Sign,* that ſuch an Ulcer can *never be cleanſed by Expectoration.* He never had any great Degree of hectic Fever, or any colliquative Sweats: Had the Operation been purſued, it is more than probable, that he would have recovered; if the Aperture into the *Trachæa* had been ſomewhat larger, it would have prevented the frequent Returns of the *purulent Aſthma*; and he might have laſted in a tabid Decay ſeveral Months longer.

In the ſame Year I was ſent for to a young Gentleman of Diſtinction, who had been viſited for ſome Time by an eminent Phyſician, who had attended with me in the former Caſe. He had complained for a conſiderable Time of a Pain in his left Side, which was broad, not confined to a Point: In the Progreſs of it, he became hectic, and expectorated a large Quantity of purulent Matter; at the Time I ſaw him the Diſcharge was more moderate, but it had been frequently ſo, and returned again in greater Quantities. I was convinced from the Symptoms, and the Manner of Expectoration, that the Ulcer could never be *cleanſed*, and adviſed the Operation: His Cauſe was then thought not ſo dangerous, as to require it; and the former internal Regimen, which in every Reſpect was proper, was only continued. In about a Fortnight afterwards I was ſent for again, and was ſurprized to find a Surgeon there, with his Apparatus ready, and prepared for an immediate Operation. The Place was marked by the Phyſician who had attended him; the Operation was ſafely performed, but no Matter was diſcharged. He died ſome Time afterwards, before the Wound was healed: On opening his Body, the Aperture was unfortunately made an Inch and a half below the *Cyſtis*. This *adhered* to the Pleura, which was much *incraſſated,* but not remarkably hard. It contained about eight Ounces of purulent Matter, and ſtrongly repreſented what *Hippocrates* calls the Κοιλὶη, with its Walls, or Sides. The Reſt of the Lungs was ſound: If the Operation had been rightly directed, he probably would have recovered.

THUS I have endeavoured to explain the various Origin, and Progreſs of the Diſeaſes of the Lungs through its different Stages, and the Method of Cure ſuited to them. And though I ſhould chuſe to avoid examining into the Errors of others; yet I cannot forbear mentioning an Hypotheſis, which has been often aſſumed as the original Cauſe of a Conſumption, and ſeveral other Diſeaſes; and which ſome may be more inclined to believe, as occular Demonſtration is offered to confirm the Truth of it.

IT has been obſerved, that *Ulcers* in the Lungs, and in other Parts, when narrowly viewed with Microſcopes, are covered with ſeveral *Inſects*; from whence it has been concluded, that they owed their Origin to them, and by being inſpired with the Air, fixed their Situation on the Lungs, eroded, and ulcerated them: From the ſame irregular Way of Reaſoning, theſe Animalcules have been by others ſuppoſed the Cauſe of ſeveral Diſtempers, and particularly ſuch as are contagious. It is certain, that there is an infinite Number, and Variety of ſuch Animalcules floating in the Air, which will always fix where they can find a *ſafe Situation* for themſelves, and their *Eggs*: But every living Part of a human Body, has a perpetual Pulſation; which, though imperceptible to our Eyes, is ſufficiently ſtrong to give an uneaſy Motion to theſe very minute Animalcules, and to prevent them from fixing themſelves for any Length of Time. But as the Inconvenience of this Pulſation in a great Meaſure ceaſes where *purulent Matter* is formed; and as it is *viſcid*, and *adheſive*, they find there not only a more ſecure *Nidus*, but Materials for their *Nouriſhment*. The *Blaſts* of Trees, and Plants, may be more eaſily thus explained, than by bringing ſuch *Animalcules*, and their Eggs, ſo many Hundred Leagues to produce theſe Alterations; for there is a *Circulation* of Humours through all the Veſſels of *Trees*, and *Plants*, and in their *aerial* Tubes a more remarkable *Pulſation*; which is ſufficiently ſtrong to prevent theſe Animalcules, perhaps more minute than ſuch as are obſerved in human Bodies, from having a fixed, and ſafe Situation there: But whenever any particular *Wind*, or Alteration of the *Air*, by either giving a ſudden *Contraction* to their Veſſels, or a *Viſcidity* to their Juices, produces a *Stagnation*, and thence a *Gangrene*; ſuch Animalcules will naturally ſecure this quiet *Seat*, and *Nouriſhment*.

THIS infinite Number of Animalcules which ſwarm in the Air, and on the Surface of the Earth, ſeem to me to be of much greater Uſe, and Importance, than is generally imagined; as all ſtagnating

animal,

animal, and vegetable Humours are quickly taken up by them, and receive a *new Life*, and regular *Circulation*; and perhaps we owe our Safety in ſome Meaſure to this ſcarcely viſible Part of the Creation; without which the *Atmoſphere* would in a ſhort Time become highly *corrupted*, and unfit to continue the *Life* of other Animals.

FINIS.

ERRATA.

Page 54. Line 19. for *Wallai*, read *Wallæi*. Page 86. Line 21. for *Ephein*, read *Ephem*. Page 94. Line 19. for *Vicidity*, read *Viſcidity*. Page 131. Line 12. after $\frac{bf}{z}$ add $=$. Page 214. Line 16. for *Rhuburb*, read *Rhubarb*. Page 356. Line 5. *renders*, read *render*. Page 362. Line 3. after *exhaled*, add *a thin Fluid*.